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## TABLE OF CONTENTS.

	PAGE
EDITORIAL.....	1-4
EDWARD L. THORNDIKE. <i>The Contribution of Psychology to Education</i> .....	5-12
W. H. WINCH. <i>Some Measurements of Mental Fatigue in Adolescent Pupils in Evening Schools</i> .....	13-24, 83-100
CARL E. SEASHORE. <i>The Class Experiment</i> .....	25-30
GUY MONTROSE WHIPPLE. <i>The Spelling of University Students</i> .....	31-33
E. C. SANFORD AND W. H. BURNHAM. <i>Twentieth Anniversary of Clark University</i> .....	33-36
HENRY S. CURTIS. <i>The National Child Conference</i> .....	37
<i>Third International Congress for Home Education, Brussels, August 21-25, 1910</i> .....	38-39
WILL GRANT CHAMBERS. <i>Individual Differences in Grammar-Grade Children</i> .....	61-75
E. A. KIRKPATRICK. <i>The Point of View of Genetic Psychology</i> .....	76-82
FLOYD CARLTON DOCKERAY. <i>The Span of Vision in Reading and the Legibility of Letters</i> .....	123-131
MARY SUTTON MACY. <i>The Sub-Normal Child in New York City Schools</i> .....	132-144
JOHN FRANKLIN BROWN. <i>The Courses in Education in German Universities</i> .....	145-158
W. VAN DYKE BINGHAM. <i>Educational Psychology at the Boston Meeting of the American Association for the Advancement of Science</i> .....	159-167
J. E. WALLACE WALLIN. <i>The Doctrine of Formal Discipline</i> .....	168-171
J. F. MESSENGER. <i>The Organization of the Department of Education at the University of Vermont</i> .....	171-173
W. C. BAGLEY. <i>The Indianapolis Meeting of the Department of Superintendence, March 1-3, 1910</i> .....	173-177
W. F. BOOK. <i>The Role of the Teacher in the Most Expeditious and Economic Learning</i> .....	183-199
J. E. WALLACE WALLIN. <i>Has the Drill Become Obsolescent?</i> .....	200-213
GUY MONTROSE WHIPPLE. <i>The Effect of Practise Upon the Range of Visual Attention and of Visual Apprehension</i> .....	249-262
J. B. MINER. <i>The College Laggard</i> .....	263-271
WILLIAM CARL RUEDIGER AND GEORGE DRAYTON STRAYER. <i>The Qualities of Merit in Teachers</i> .....	272-278
IRVING KING. <i>Measurement of the Physical Growth of Two Children</i> .....	279-286
W. VAN DYKE BINGHAM. <i>The Use of Experiment in Teaching Educational Psychology</i> .....	287-292

# THE JOURNAL OF EDUCATIONAL PSYCHOLOGY.

	PAGE
C. E. SEASHORE. <i>The Mid-day Nap</i> .....	293-295
C. E. SEASHORE AND E. A. JENNER. <i>Training the Voice by the Aid of the Eye in Singing</i> .....	311-320
J. P. GILBERT. <i>An Experiment on Methods of Teaching Zoölogy</i> .....	321-332
DAVID SPENCE HILL. <i>An Experience with Correlation and the Class Experiment</i> .....	333-343
F. S. LUNT. <i>Some Investigations of Habits of Study</i> .....	344-348
W. F. DEARBORN. <i>Experiments in Learning</i> .....	273-388
G. VATTIER. <i>Experimental Pedagogy in France</i> .....	389-403
X GUY MONTROSE WHIPPLE. <i>Notes on the Recall of Nonsense Syllables</i> .....	401-405
HUGO MUENSTERBERG. <i>Basedow's Elementarwerk</i> .....	405-406
J. C. BELL. <i>The Boston Meeting of the National Education Association, July 2-8, 1910</i> .....	406-413
G. E. JOHNSON. <i>Notes on the Session of the Playground Congress, June 7-11, 1910</i> .....	413-414
EDMUND B. HUEY. <i>The Binet Scale for Measuring Intelligence and Retardation</i> .....	435-444
J. E. WALLACE WALLIN. <i>The Rationale of Promotion and the Elimination of Waste in the Elementary and Secondary Schools</i> .....	445-466
ANNA J. MCKEAG. <i>The Use of Illustrative Experiments in Classes in Education</i> .....	467-472
EDWARD L. THORNDIKE. <i>William James</i> .....	473-474
W. H. PYLE. <i>One Function of the Teacher in Memory Work</i> .....	474-476
ERNEST JONES. <i>Psycho-Analysis and Education</i> .....	497-520
HENRY H. GODDARD. <i>The Application of Educational Psychology to the Problems of the Special Class</i> .....	521-531
C. E. SEASHORE. <i>Preparation for Examinations in Psychology</i> .....	532-537
WALTER R. MILES. <i>A Study in the Correlation of Elementary and High School Grades</i> .....	537-538
W. S. SMILEY. <i>A Comparative Study of the Results Obtained in the Elementary Branches of Rural and Graded Schools</i> .....	538-539
C. B. ROBERTSON. <i>The Effect of the Training School Upon the Child as Shown in His Subsequent School Work</i> .....	539-543
ANNA J. MCKEAG. <i>Educational Psychology at the Third International Congress of School Hygiene</i> .....	543-544
X W. H. WINCH. <i>Accuracy in School Children: Does Improvement in Numerical Accuracy "Transfer"?</i> .....	557-589
EDMUND C. SANFORD. <i>Experimental Pedagogy and Experimental Psychology</i> .....	590-595
W. C. BAGLEY. <i>Conference of City Superintendents of Wisconsin. Announcement of the Journal of Animal Behavior</i> .....	596-597
ABSTRACTS AND REVIEWS.....	40, 107, 214, 296, 349, 415, 477, 600
NOTES AND NEWS.....	55, 119, 178, 241, 307, 368, 426, 488, 545, 611
PUBLICATIONS RECEIVED.....	58, 122, 182, 248, 310, 370, 433, 493, 552, 616

## INDEX OF NAMES.

Authors of original articles, communications or discussions have names printed in CAPITALS, and page numbers in **bold face** type. Authors reviewed, contributors of reviews and authors mentioned have page numbers in Roman.

- Allen, Wm. A., 48.  
 American Institute of Criminal Law and Criminology, 423.  
 Anderson, Lewis F., 239.  
 Arnold, Felix, 165, 485.  
 BAGLEY, W. C., 50, 116, 118, **173**, 214, 231, 304, 364, 418, 419, 422, 423, 596.  
 Bailey, Eliza R., 305.  
 Baumer, Gertrude, 219.  
 BELL, J. C., 288, **406**, 606.  
 Bentley, Madison, 108.  
 Berry, C. S., 110.  
 Betts, George Herbert, 216.  
 Binet, A., 390, 435, 482.  
 BINGHAM, W. VAN DYKE, **159**, 287.  
 Birdseye, C. F., 357.  
 Bobbitt, J. F., 108.  
 BOOK, W. F., **183**.  
 BROWN, JOHN FRANKLIN, **145**.  
 Buchholz, 266.  
 Burgerstein, L., 35.  
 BURNHAM, W. H., **33**.  
 Burt, Cyril, 364.  
 Carr, H., 233.  
 CHAMBERS, WILL GRANT, **61**, 218.  
 Charters, W. W., 235.  
 Chase, H. W., 52.  
 Cole, L. W., 360.  
 Colvin, S. S., 112.  
 Cook, Helen D., 300.  
 Curtis, S. A., 606.  
 Crampton, C. W., 233, 423.  
 CURTIS, HENRY S., **37**.  
 Davenport, E., 239.  
 Davis, Michael M., 477.  
 DEARBORN, W. F., 161, **373**, 537.  
 De Garmo, Charles, 42, 479.  
 Devine, Edward C., 479.  
 Dewey, J., 117, 304, 419.  
 DOCKERAY, FLOYD CARLTON, **123**.  
 Droescher, Lili, 219.  
 Duprat, G. L., 424.  
 Edinger, L., 362.  
 Eliot, Chas. W., 231.  
 Falkner, R. P., 116.  
 Fisher, Henry, 232.  
 Francis, John, 225, 230.  
 Frend, S., 35, 498.  
 Galton, Fr., 107.  
 Gault, Robert H., 480.  
 Geissler, L. R., 52.  
 Gibbs, David, 486.  
 GILBERT, J. P., **321**.  
 Gillin, J. L., 477.  
 GODDARD, HENRY H., 226, **521**.  
 Gonin, J., 225.  
 Haggerty, M. E., 111, 164.  
 Heck, W. H., 50.  
 HILL, DAVID SPENCE, **333**.  
 Hood, Cornelius, 418.  
 HUEY, EDMUND B., **435**.  
 James, Wm., 473.  
 JENNER, E. A., **311**.  
 JOHNSON, G. E., **413**.  
 Johnston, C. H., 116.  
 JONES, ERNEST, **497**.  
 Jones, Olive M., 296.  
 Judd, C. H., 113, 160, 418.  
 KING, IRVING, **279**.  
 KIRKPATRICK, E. A., 45, 76, 218.  
 Knuth, Paul Wilhelm, 421, 425.  
 Leary, Eleanor G., 296.  
 Lee, Frederick S., 600.  
 Long, F. M., 360.  
 Lounsbury, Thos. R., 228.  
 Lowell, A. L., 412.  
 LUNT, F. S., **344**.  
 McConn, C. M., 228.  
 MacDougall, W., 600.  
 M'KEAG, ANNA J., **467**, **543**.  
 McMurray, F. M., 349, 344.  
 MACY, MARY SUTTON, **132**.  
 Major, Gustav, 425.  
 Manley, John M., 305.  
 Manny, Frank A., 220.  
 Meiklejohn, Alex., 230.  
 Mendousse, J., 480.  
 MESSENGER, J. F., **171**.  
 Meumann, E., 2, 40, 302.  
 MILES, WALTER R., 225, 364, **537**.  
 MINER, J. B., **263**.  
 Mitchell, S. Wier, 225.  
 Morgan, T. H., 422.  
 MUENSTERBERG, H., 42, **405**.  
 Norsworthy, N., 288.  
 Norton, E. L., 222.  
 Noyes, W., 231.  
 Offner, Max, 600.

THE JOURNAL OF EDUCATIONAL PSYCHOLOGY.

- Olin, Arvin S., 239.  
 O'Shea, M. V., 353.  
 Parsons, Belle Ragner, 233.  
 Pattee, Fred Lewis, 222.  
 Payot, J., 118.  
 Plaisted, Laura L., 220.  
 PYLE, W. H., 353, 474.  
 Quish, Agnes E., 296.  
 ROBERTSON, C. B., 539.  
 Rogers, C. J., 420.  
 Royce, J., 1.  
 RUEDIGER, WILLIAM CARL, 272, 485.  
 Sandiford, Peter, 113, 115.  
 SANFORD, EDMUND C., 33, 590.  
 Scott, Walter D., 165, 420.  
 SEASHORE, C. E., 25, 117, 231, 232, 233, 239, 293, 311, 532.  
 Sidis, Boris, 421.  
 Simpson, B. F., 45, 235.  
 SMILEY, W. S., 538.  
 Smith, D. E., 162, 606.  
 Snedden, David, 364, 407, 413.  
 Sollier, Paul, 480.  
 Starch, Daniel, 40.  
 Stern, W., 34.  
 Stewart, Rolland M., 424.  
 Stiles, Percy G., 486.  
 Stolz, Karl, 224.  
 Stone, Cliff Winfield, 606.  
 STRAYER, GEORGE DRAYTON, 272.  
 Strong, Anna Louise, 224.  
 Sutherland, Wm. H., 486.  
 Swift, F. H., 357.  
 Sybel, A. von, 214.  
 THORNDIKE, EDWARD L., 5, 16, 115, 159, 473.  
 VATTIER, G., 389, 480, 482.  
 WALLIN, J. E. WALLACE, 168, 200, 296, 349, 445.  
 Watson, J. B., 233, 360.  
 WHIPPLE, GUY MONTROSE, 31, 48, 101, 107, 108, 112, 216, 219, 226, 249, 305, 404, 423, 486, 600.  
 Winbigler, Charles F., 226.  
 WINCH, W. H., 13, 83, 557.  
 Woolley, Helen Thompson, 418.  
 Wundt, W., 300.  
 Yerkes, Ada W., 110, 111, 233, 360, 362, 415.  
 Yerkes, Robert M., 164, 415, 597.  
 Yoakum, Clarence Stone, 600.

## INDEX OF SUBJECTS.

- Accuracy, 557.  
 Adolescence, 480.  
 Animal Behavior, 110, 111, 233, 360, 362, 415, 597.  
 Aphasia, 225.  
 Applied Psychology, 300.  
 Apprehension, Visual, 250.  
 Arithmetic, 19, 91, 557, 606.  
 Attention, 43, 52, 250, 485.  
 Attitudes, Doctrine of, 113.  
 Balance, Pressure-Pain, 104.  
 Basedow's Elementarwerk, 405.  
 Boston Meeting of National Education Association, 406.  
 Brightness Discrimination, Instruments for, 101.  
 Child Conference, National, 37.  
 Child Psychology, 219, 482.  
 Civics and Health, 48.  
 Clark University, Twentieth Anniversary of, 33.  
 Class Experiment, 25, 333.  
 College, Competition in, 230.  
 College, Individual Training in, 357.  
 Conference of City Superintendents of Wisconsin, 596.  
 Correlation, 333, 537.  
 Criminology, 423, 424.  
 Defectives, 132, 395, 410, 425, 435, 521.  
 Development, 218.  
 Development, Social, 353.  
 Differences, Mental, 61.  
 GAL TWO—INDEX  
 Discipline, Mental, 50.  
 Doubt, 480.  
 Drill, 200.  
 Economic Learning, 183.  
 Editorial, 1.  
 Education, Common School, History of, 239.  
 Education, Contribution of Psychology to, 5.  
 Education for Efficiency, 231, 239.  
 Education, Illustrative Experiments in, 467.  
 Education, Industrial, 407.  
 Education in German Universities, 145.  
 Education in University of Vermont, 171.  
 Education, Moral, 117, 304.  
 Education of Children, 220, 482.  
 Education of Will, 118.  
 Education, Social Development and, 353.  
 Education, Tendencies in, 116, 364.  
 Educational Psychology, 1, 159, 287, 521, 543, 596.  
 Eugenics, 108, 479.  
 Evening Schools, Mental Fatigue in, 13, 83.  
 Evolution, 422.  
 Examinations in Psychology, 532.  
 Experiment, Class, 25, 333.  
 Experiment in Educational Psychology, 287.  
 Experimental Pedagogy, 2, 40, 61, 389, 418, 435, 482, 537, 538, 539, 590, 606.  
 Experiments in Education, 467.  
 Fatigue, 13, 83, 600.  
 Formal Discipline, 50, 168.  
 Galton's Autobiography, 107.  
 Genetic Psychology, 45, 76.  
 Geography, 486.  
 Grades, Elementary and High School, 537.  
 Growth, Measurements of, 279.  
 Habits of Study, 344.  
 Health, Civics and, 48.  
 Heredity, 108.  
 History of Common School Education, 239.  
 Home Education, Third International Congress of, 38.  
 Ideational Type, 112.  
 Images, 214.  
 Imitation in Cats, 110.  
 Imitation in Monkeys, 111.  
 Individual Differences, 61.  
 Industrial Education, 407.  
 Instruments, New, 101.  
 Intelligence, Tests of, 61, 364, 435.  
 James, William, 473.  
 Laggards, 445.  
 Laggards, College, 263.  
 Learning, 183, 218, 373.  
 Letters, Legibility of, 123.  
 Manual Training, 231.  
 Measurements of Mental Fatigue, 13, 83.  
 Measurements of Physical Growth, 279.  
 Memory, 84, 214, 384, 404, 474.  
 Mental Discipline, 50.

# THE JOURNAL OF EDUCATIONAL PSYCHOLOGY.

- Mental Fatigue, 13, 83, 600.
- Mental Functions, Specialization of, 115.
- Mental Imagery, 214, 216.
- Mental Tests, 61, 364, 435, 606.
- Merit in Teachers, 272.
- Methods of Teaching, 235.
- Moral Education, 117, 304.
- Motor Ataxia, 225.
- Motor Processes, 113, 486.
- Muscular Action, 486.
- Music Teachers, Psychology for, 232.
- National Child Conference, 37.
- National Education Association, 406.
- New York City Schools, 132.
- Notes and News, 55, 119, 178, 241, 307, 368, 426, 488, 545, 611.
- Orientation in the White Rat, 233.
- Pain, 104.
- Pedagogy, Experimental, 2, 40, 61, 389, 418, 435, 482, 537, 538, 539, 590, 606.
- Pedagogy, Religious, 222.
- Perception, 113.
- Play, 233, 413, 423.
- Pressure, 104.
- Promotion, 445.
- Psycho-Analysis, 497.
- Psychology and the Teacher, 42.
- Psychology, Child, 219, 590.
- Psychology, Comparative, 110, 111, 233, 360, 362, 415, 597.
- Psychology, Contribution to Education, 5.
- Psychology for Music Teachers, 232.
- Psychology, Genetic, 45.
- Psychology of Prayer, 224.
- Psychology, Pure and Applied, 300, 590.
- Psychology, Social, 477, 479.
- Publications Received, 58, 122, 182, 248, 310, 370, 433, 493, 552, 616.
- Reading, 123.
- Retardation, 116, 435, 445.
- Right-handedness, 418.
- Rural Schools, 538.
- School Hygiene, 48, 497, 543.
- Science Teaching, 321, 419.
- Sex Hygiene, 507.
- Shorthand, 93.
- Singing, 232, 311.
- Sleep, 293, 421.
- Special Class, 132, 395, 410, 521.
- Specialization of Mental Functions, 115.
- Spelling, 31, 200, 228, 305.
- Statement, 226.
- Study, Teaching how to, 296, 344, 349.
- Subnormal Children, 132, 395, 410, 425, 435, 521.
- Suggestion, 226, 420.
- Superintendence, Department of, 173.
- Superintendents of Wisconsin, 598.
- Teaching Children to Study, 296.
- Teaching, Methods of, 235.
- Teacher, Role of, 183, 474.
- Teachers, Merit in, 272.
- Training Schools, Results of, 539.
- Transfer of Training, 168, 557.
- Ungraded Classes, 132, 395, 410, 521.
- Vision in Animals, 360.
- Voice Training, 311.
- Will, Education of, 118.
- Wisconsin, Conference of City Superintendents of, 596.
- Zoology, Methods of Teaching, 321.



Peter Sawyer

## EDITORIAL

Not many years ago, Professor Royce argued with force and insight the need of a "middleman" whose task should be to mediate between the science of psychology and the art of teaching—a man of careful laboratory training and with an abiding interest in the problems of the schoolroom. The editors of this Journal believe that there is equal need of a "middle-magazine"—of a journal that shall afford a common meeting ground for the psychologist and the educator. We seek to supply the worker in the laboratory with a channel for the promulgation of those results of his investigation of mental life that bear, directly or indirectly, upon the problems of teaching, and we seek to enlist and stimulate the interest of schoolmen in the discussion of the varied and highly important problems of education that have psychological bearing. We regard, then, this Journal as a clearing-house for the exchange of information upon all that concerns the relation of psychology to education.

To accomplish this purpose, we propose to print in each issue a number of original contributions, to provide adequate space for discussions and communications upon matters of interest, to report as promptly as possible the news items which concern the workers in our field, and, finally, to make a special feature of accurate and useful reviews or digests that will serve to condense and coördinate the growing literature of educational psychology. We feel that such reviews will economize the time of those who are directly concerned in psychology, as well as of those many schoolmen who are ready and anxious to advance the cause of education, but who have neither the time nor the energy themselves to follow in technical journals the results of research and investigation.

The term "Educational Psychology" will, for our purposes, be interpreted in a broad sense as covering all those phases of the study of mental life which concern education. Educational psychology will then be regarded as including not only the well-known field covered by the

average text-book—the psychology of sensation, instinct, attention, habit, memory, the technique and economy of learning, the conceptual processes, etc.—but also problems of mental development—heredity, adolescence and the inexhaustible field of child-study—the study of individual differences, of retarded and precocious development, the psychology of the “special class,” the nature of mental endowments, the measurement of mental capacity, the psychology of mental tests, the correlation of mental abilities, the psychology of special methods in the several school branches, the important problems of mental hygiene; all these, whether treated from the experimental, the statistical or the literary point of view, are topics and problems which we deem pertinent for consideration in a Journal of Educational Psychology.

As a particular feature, we desire to perform for this country a service such as Meumann's *Zeitschrift für Experimentelle Pädagogik* is performing for Germany; that is, to stimulate interest in, and further the progress of experimental pedagogy, for we believe that the time is ripe for the study of schoolroom problems in the schoolroom itself and by the use of the experimental method. Educational practice is still very largely based upon opinion and hypothesis, and thus will it continue until competent workers in large number are enlisted in the application of the experimental method to educational problems. Little more than a beginning has been made in this important movement. We may well quote the observation of Fechner, when he contemplated the possibilities of the new science of psychophysics: “Here indeed, is there still open, especially to the energies of younger folk, a rich field for future investigation,—investigation which is not in itself difficult, but which demands attention, patience, perseverance, and honesty.”<sup>1</sup>

It has been remarked that “the whole educational trade does its business today with small coin,” and many would like to add that too often even that coin fails to “ring true.” We propose in this Journal to refrain from the iteration of the trite aphorisms of educa-

<sup>1</sup> “Vielmehr bietet sich in dieser Hinsicht noch ein reiches Feld künftiger Untersuchung, namentlich für jüngere Kräfte . . . dar, einer Untersuchung die an sich nicht schwierig ist, aber Geduld, Aufmerksamkeit, Ausdauer, und Treue erfordert ”

tional thought. We propose to maintain a high standard of scientific worth and reliability, to print what is worth printing, and to attack, as skilfully as we may, the problems that press for solution in our field. Only in such a way, we believe, can education conserve the dignity of a profession and win an unchallenged place in the ranks of science.

Finally, it should be said that this magazine is not the organ of any man or institution, or of any group of men or institutions; nor is it the champion of any special movement. Our columns are, within the limitations of space, open for the helpful presentation and discussion of the problems that have been outlined, and we welcome the coöperation of all who are interested in the furtherance of our aims.



# THE CONTRIBUTION OF PSYCHOLOGY TO EDUCATION

EDWARD L. THORNDIKE

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Psychology is the science of the intellects, characters and behavior of animals including man. Human education is concerned with certain changes in the intellects, characters and behavior of men, its problems being roughly included under these four topics: Aims, materials, means and methods.

Psychology contributes to a better understanding of the aims of education by defining them, making them clearer; by limiting them, showing us what can be done and what can not; and by suggesting new features that should be made parts of them.

Psychology makes ideas of educational aims clearer. When one says that the aim of education is culture, or discipline, or efficiency, or happiness, or utility, or knowledge, or skill, or the perfection of all one's powers, or development, one's statements, and probably one's thoughts, need definition. Different people, even amongst the clearest-headed of them, do not agree concerning just what culture is, or just what is useful. Psychology helps here by requiring us to put our notions of the aims of education into terms of the exact changes that education is to make, and by describing for us the changes which do actually occur in human beings.

Psychology helps to measure the probability that an aim is attainable. For example, certain writers about education state or imply that the knowledge and skill and habits of behavior which are taught to the children of today are of service not only to this generation and to later generations through the work this generation does, but also to later generations forever through the inheritance of increased capacity for knowledge and skill and morals. But if the mental and moral changes made in one generation are not transmitted by heredity to the next generation, the improvement of the race by direct transfer of acquisitions is a foolish, because futile aim.

Psychology enlarges and refines the aim of education. Certain features of human nature may be and have been thought to be unimportant or even quite valueless because of ignorance of psychology. Thus for hundreds of years in the history of certain races even the most gifted thinkers of the race have considered it beneath the dignity of education to make physical health an important aim. Bodily welfare was even thought of as a barrier to spiritual growth, an undesirable interferer with its proper master. Education aimed to teach it its proper place, to treat it as a stupid and brutish slave. It is partly because psychology has shown the world that the mind is the servant and co-worker as well as the master of the body, that the welfare of our minds and morals is intimately bound up with the welfare of our bodies, particularly of our central nervous systems, that today we can all see the eminence of bodily health as an aim of education.

To an understanding of the material of education, psychology is the chief contributor.

Psychology shares with anatomy, physiology, sociology, anthropology, history and the other sciences that concern changes in man's bodily or mental nature the work of providing thinkers and workers in the field of education with knowledge of the material with which they work. Just as the science and art of agriculture depend upon chemistry and botany, so the art of education depends upon physiology and psychology.

A complete science of psychology would tell every fact about every one's intellect and character and behavior, would tell the cause of every change in human nature, would tell the result which every educational force—every act of every person that changed any other or the agent himself—would have. It would aid us to use human beings for the world's welfare with the same surety of the result that we now have when we use falling bodies or chemical elements. In proportion as we get such a science we shall become masters of our own souls as we now are masters of heat and light. Progress toward such a science is being made.

Psychology contributes to understanding of the means of education, first, because the intellects and characters of any one's parents, teachers and friends are very important means of educating him, and, second,

because the influence of any other means, such as books, maps or apparatus, cannot be usefully studied apart from the human nature which they are to act upon.

Psychology contributes to knowledge of methods of teaching in three ways. First, methods may be deduced outright from the laws of human nature. For instance, we may infer from psychology that the difficulty pupils have in learning to divide by a fraction is due in large measure to the habit established by all the thousands of previous divisions which they have done or seen, the habit, that is, of "division—decrease" or "number divided—result smaller than the number." We may then devise or select such a method as will reduce this interference from the old habits to a minimum without weakening the old habits in their proper functioning.

Second, methods may be chosen from actual working experience, regardless of psychology, as a starting point. Thus it is believed that in the elementary school a class of fifteen pupils for one teacher gives better results than either a class of three or a class of thirty. Thus, also, it is believed that family life is better than institutional life in its effects upon character and enterprise. Thus, also, it is believed that in learning a foreign language the reading of simple discussions of simple topics is better than the translation of difficult literary masterpieces that treat subtle and complex topics. Even in such cases psychology may help by explaining *why* one method does succeed better and so leading the way to new insights regarding other questions not yet settled by experience.

Third, in all cases psychology, by its methods of measuring knowledge and skill, may suggest means to test and verify or refute the claims of any method. For instance, there has been a failure on the part of teachers to decide from their classroom experience whether it is better to teach the spelling of a pair of homonyms together or apart in time. But all that is required to decide the question for any given pair is for enough teachers to use both methods with enough different classes, keeping everything else except the method constant, and to measure the errors in spelling the words thereafter in the two cases. Psychology, which teaches us how to measure changes in human nature, teaches us how to decide just what the results of any method of teaching are.

So far I have outlined the contribution of psychology to education from the point of view of the latter's problems. I shall now outline very briefly the work being done by psychologists which is of special significance to the theory and practice of education and which may be expected to result in the largest and most frequent contributions.

It will, of course, be understood that directly or indirectly, soon or late, every advance in the sciences of human nature will contribute to our success in controlling human nature and changing it to the advantage of the common weal. If certain lines of work by psychologists are selected for mention here, it is only because they are the more obvious, more direct and, so far as can now be seen, greater aids to correct thinking about education.

The first line of work concerns the discovery and improvement of means of measurement of intellectual functions. (The study of means of measuring moral functions such as prudence, readiness to sacrifice an immediate for a later good, sympathy, and the like, has only barely begun.) Beginning with easy cases such as the discrimination of sensory differences, psychology has progressed to measuring memory and accuracy of movement, fatigue, improvement with practice, power of observing small details, the quantity, rapidity and usefulness of associations, and even to measuring so complex a function as general intelligence and so subtle a one as suggestibility.

The task of students of physical science in discovering the thermometer, galvanometer and spectroscope, and in defining the volt, calorie erg, and ampère, is being attempted by psychologists in the sphere of human nature and behavior. How important such work is to education should be obvious. At least three-fourths of the problems of educational practice are problems whose solution depends upon the *amount* of some change in boys and girls. Of two methods, which gives the *greater* skill? Is the gain in general ability from a "disciplinary" study so great as to outweigh the loss in specially useful habits? Just how much more does a boy learn when thirty dollars a year is spent for his teaching than when only twenty dollars is spent? Units in which to measure the changes wrought by education are essential to an adequate science of education. And, though the students of education may establish these units by their own investigations, they can use and will need all the experience of psychologists in the search for similar units.



The second line of work concerns race, sex, age and individual differences in all the many elements of intellect and character and behavior.

How do the Igorottes, Ainus, Japanese and Esquimaux differ in their efficiency in learning to operate certain mechanical contrivances? Is the male sex more variable than the female in mental functions? What happens to keenness of sensory discrimination with age? How do individuals of the same race, sex and age differ in efficiency in perceiving small visual details or in accuracy in equaling a given length, or in the rapidity of movement? These are samples of many questions which psychologists have tried to answer by appropriate measurements. Such knowledge of the differences which exist amongst men for whatever reason is of service to the thinker about the particular differences which education aims to produce between a man and his former self.

These studies of individual differences or variability are being supplemented by studies of correlations. How far does superior vividness and fidelity in imagery from one sense go with inferiority in other sorts of imagery? To what extent is motor ability a symptom of intellectual ability? Does the quick learner soon forget? What are the mental types that result from the individual variations in mental functions and their inter-correlations? Psychology has already determined with more or less surety the answers to a number of such questions instructive in their bearing upon both scientific insight into human nature and practical arrangements for controlling it.

The extent to which the intellectual and moral differences found in human beings are consequences of their original nature and determined by the ancestry from which they spring, is a matter of fundamental importance for education. So also is the manner in which ancestral influence operates. Whether such qualities as leadership, the artistic temperament, originality, persistence, mathematical ability, or motor skill are represented in the germs each by one or a few unit characters so that they "Mendelize" in inheritance, or whether they are represented each by the coöperation of so many unit characters that the laws of their inheritance are those of "blending" is a question whose answer will decide in great measure the means to be employed for racial improvement. Obviously both the amount and

the mode of operation of ancestral influence upon intellect and character are questions which psychology should and does investigate.

The results and methods of action of the many forces which operate in childhood and throughout life to change a man's original nature are subjects for study equally appropriate to the work of a psychologist, a sociologist or a student of education, but the last two will naturally avail themselves of all that the first achieves. Although as yet the studies of such problems are crude, speculative and often misguided, we may hope that the influence of climate, food, city life, the specialization of industry, the various forms of the family and of the state, the different "studies" of the schools, and the like will come to be studied by as careful psychologists and with as much care as is now the case with color-vision or the perception of distance.

The foundation upon which education builds is the equipment of instincts and capacity given by nature apart from training. Just as knowledge of the peculiar inheritance characteristic of any individual is necessary to efficient treatment of him, so knowledge of the unlearned tendencies of man as a species is necessary to efficient planning for education in general. Partly in conscious response to this demand and partly as a result of growing interest in comparative and genetic psychology, there have been in the last two decades many studies by psychologists of both the general laws of instinct and their particular natures, dates of appearance and disappearance, and conditions of modifiability. The instincts of attitude—of interest and aversion—are of course to be included here, as well as the tendencies to more obviously effective responses.

It is unfortunately true that the unlearned tendencies to respond of ants and chickens have been studied with more care than those of men, and also that the extreme complexity and intimate mixture with habits in the case of human instincts prevent studies of them, even when made with great care, from giving entirely unambiguous and elegant results. But the educational theorist or practitioner who should conclude that his casual observations of children in homes and schools needs no reinforcement from the researches of psychologists would be making the same sort of, thought not so great, an error as the pathologist or physician who should neglect the scientific studies of bacteria and protozoa. Also the psychologist who condemns these

studies *in toto* because they lack the precision and surety of his own studies of sensations and perceptual judgments is equally narrow, though from a better motive.

The modifications of instincts and capacities into habits and powers and the development of the latter are the subjects of researches in dynamic psychology which are replacing the vague verbal and trite maxims of what used to be called "applied psychology" by definite insights into reality far in advance of those which common-sense sagacity alone can make. We are finding out when and why "practice makes perfect" and when and why it does not; wherein the reinforcement of a connection between situation and response by resulting satisfaction is better than the inhibition of alternative connections by discomfort and wherein it is not; what the law of diminishing returns from equal amounts of practice is, what it implies, and how it is itself limited; how far the feelings of achievement, of failure and of fatigue are symptomatic of progress, retardation and unfitness for work. Such a list of topics could be much extended even now and is being increased rapidly as more psychologists and more gifted psychologists come to share in the study of the learning process.

Only twenty years ago a student could do little more than add to his own common-sense deductions from the common facts of life the ordered series of similar deductions by the sagacious Bain. Bain utilized all the psychology of his day as well as the common fund of school-room experience, but today his book is hopelessly outgrown. Although it was the source of the minor books on the topic during the eighties and nineties, no one would now think of presenting the facts of the science of education by a revised edition of Bain.

Other lines of psychological work deserve more than mention. Incidental contributions from studies of sensory and perceptual processes, imagery and memory, attention and distraction, facilitation, inhibition and fatigue, imitation and suggestion, the rate and accuracy of movement and other topics—even from studies made with little or no concern about the practical control of human nature—sum up to a body of facts which do extend and economize that control. The special psychology of babies, children and adolescents is obviously important to education. False infant psychology or false child psychology is harmful, not because it is infant psychology, but because it is false.

I give only mention to these so as to save space in which to call attention to another relation between psychology and education which is not sufficiently known. The science of education can and will itself contribute abundantly to psychology. Not only do the laws derived by psychology from simple, specially arranged experiments help us to interpret and control mental action under the conditions of school-room life. School-room life itself is a vast laboratory in which are made thousands of experiments of the utmost interest to "pure" psychology. Not only does psychology help us to understand the mistakes made by children in arithmetic. These mistakes afford most desirable material for studies of the action of the laws of association, analysis and selective thinking. Experts in education studying the responses to school situations for the sake of practical control will advance knowledge not only of the mind as a learner under school conditions but also of the mind for every point of view.

Indeed I venture to predict that this journal will before many years contain a notable proportion of articles reporting answers to psychological questions got from the facts of educational experience, in addition to its list of papers reporting answers to educational questions got from the experiments of the laboratory.

All that is here written may seem very obvious and needless, and meet the tragic fate of being agreed with by every one who reads it. I hope that it is obvious and needless, and that the relation between psychology and education is not, in the mind of any competent thinker, in any way an exception to the general case that action in the world should be guided by the truth about the world; and that any truth about it will directly or indirectly, soon or late, benefit action.

# SOME MEASUREMENTS OF MENTAL FATIGUE IN ADOLESCENT PUPILS IN EVENING SCHOOLS<sup>1</sup>

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## SUMMARY

In this investigation the tests of mental fatigue were made under actual school conditions and with school material. Classes were chosen which were as nearly homogeneous as possible. A class of artisans was tested with problems in arithmetic, a class of telegraph messengers with substance memory of a passage of prose, and classes of mixed occupations with shorthand exercises.

Each class was divided into two equal groups on the basis of a preliminary test, and each of these groups was then tested with the same exercise, the one group earlier, the other later in the evening. With the exception of a single, non-homogeneous class all the groups which were tested later in the evening showed a considerable reduction in mental ability as compared with the groups of the same class which were tested earlier.

The conclusion seems justified that evening schools, attended after long hours of labor, are comparatively unprofitable on account of the rapid decrease of mental energy in the pupil during the course of the evening's work.

## PART I

### I. WHY THIS WORK IS MOSTLY BASED ON SCHOOL EXERCISES

This, on the whole, is a practical paper. My aim is to show how, without expensive apparatus, some measure of mental fatigue in classes may be obtained under the ordinary conditions of school work.

<sup>1</sup> The results of the experiments outlined in this paper were given as evidence to the Consultative Committee of the English Board of Education in the Spring of 1909 and an abstract was presented to the British Psychological Society on May 1, 1909.

It is not because I wish to decry the more usual methods of psychological investigation that I have adopted the methods here employed—on the contrary I believe, in contradistinction to many educationists, that, from experiments with the simple and apparently trivial units of work with which psychologists usually deal, we can often draw direct and valid inferences which help us in school method, as well as conclusions as to natural ability—measured, of course, by these methods which, as Binet would say, are *extra-scolaire*. But there is no doubt that many teachers would hesitate to accept conclusions based upon work which they did not understand; so that, from the point of view of practical utility, it becomes important so to modify our psychological exercises as to make them coincident with, or similar to, the actual and usual work of the schools.

The difficulties are, of course, very great; we have to run the risk of lumping together a number of mental operations which are introspectively quite distinct, and are certainly partially distinct even when, as indeed mostly happens, their positive correlations are high. But the risk must be taken, because it is of extreme importance that teachers should understand and coöperate in this work.

## 2. HOW IT CAME TO BE DONE

When, in the summer of 1908, I was asked to give evidence before the Consultative Committee of the English Board of Education on the measurement of mental fatigue in schools, especially in relation to fatigue in evening schools, I found myself in a quandary. I knew I was to be asked what degree (if any) of actual mental fatigue was to be found in evening schools. The committee had had the most divergent evidence before it from teachers and others—who had, of course, attempted no actual measure of what they asserted to exist or not to exist. Some had spoken as if the pupil in evening school was exhausted throughout the whole session; others, I believe, had informed the committee that their pupils were so fresh that, even at 11 p.m., they could not get them to go home.

The committee had been informed that I had been for years carrying on experiments on fatigue in day schools, and they understood that I had found little evidence of any true fatigue. Was I prepared

to make the same assertion as to evening schools? Could I not, in the absence of direct personal evidence, argue by analogy that none existed? What evidence could I adduce from the experimental work done in other countries?

I had previously written to Professor Meumann in Germany and Professor Thorndike in America asking for references to work (if any) on fatigue with evening school students. None of any value appears to exist at present in either country.

Why is this? Mainly, I think, because it is so hard to get work done with adolescent evening school pupils which shall be *unwissentlich*. Nor do evening school pupils welcome innovation like day school pupils; they require to be satisfied that the thing is what they come to school for before they do it. This applies more particularly to mental work. I have no doubt that the boys would love to work an ergograph, and that both boys and girls would be interested in tests of sensibility. But ergographs cost money, and I had not enough trained observers to work the esthesiometric tests; so I was bound to fall back upon something which the students themselves felt was all in the night's work. Of course, as my readers well know who have experimented much with human beings, this was by no means wholly a disadvantage, as one avoided the spurts and alarming increases and decreases which sometimes characterize the first few of a series of new exercises.

### 3. THE PRECAUTIONS THAT WERE NECESSARY

But fatigue work in evening schools presents further difficulties. First of all, it is of little use to work with non-homogeneous classes, and most of our evening school classes are heterogeneous. Pupils of widely varying ages who are doing very different work in the day time, or even no work at all, are likely to vary so much that no steady or reliable results for the classes as wholes could be reached by any method. Fortunately, however, I was able to find some classes which were practically homogeneous.

There is a further difficulty—the number of teachers of evening classes who are willing to give thought, care and patient assistance to work of this sort is not so great as that to be found in day schools—

reasonably enough, for, under our present system of staffing evening schools, the work is *additional* to day school work; and teachers of evening schools have so little leisure that it speaks volumes for their enthusiasm that any could be induced to take up the work at all. Of course the difficulty of getting efficient coöperation is much diminished if the ordinary work of the classes is taken as a basis of the exercises given. But it must not be thought for a moment that anything like satisfactory results can be obtained unless the exercises themselves are set with unusual care in relation to the known abilities of the class, and unless the units of marking are chosen with a patience and discretion which is quite impossible in ordinary school work. And further, a degree of time and care must be spent in marking the exercises which no teacher could possibly give in his ordinary routine work. May I say that, in my judgment, the very unsatisfactory nature of much of the early work on correlation has arisen very largely from the ready acceptances of school-lists and school-markings as an adequate basis of scientific inference, and that the mental life of the child would not have been found to be quite such an uncorrelated and disconnected thing had this not been done?

#### 4. THE SCIENTIFIC INTEREST OF THE WORK

I have said that this piece of work is of a practical nature, but there are one or two points of scientific interest which I may now briefly indicate, before proceeding to a detailed account of the separate exercises with the various classes in evening schools which undertook this work.

First, I have, I believe for the first time, employed the method of *equal groups* to the solutions of questions of fatigue.

Professor Thorndike, some years ago, in a piece of fatigue work with day school pupils of New York, the publication of which did much to prevent the German scare breaking out in America as it subsequently did in England, employed a somewhat similar method, but with an important difference. He took groups which were *prob-*



*ably* equal; I have investigated the question of equality at the outset. My groups are "objectively" found to be equal at the same kind of work as that given later on by which the different effects of different states of freshness or fatigue are to be judged.

Briefly, the method employed is as follows:—Divide a given class, homogeneous in social status and daily work, into two equal sections or groups, by the application of an exercise in some mental work which, to the students, will seem part of the usual routine; this exercise being given exactly in the middle of the evening school session. Having obtained the equal groups, give similar exercises in subsequent weeks, to one group half-an-hour earlier, and to the other group half-an-hour later. The comparative average results of the two groups (subject to certain statistical conditions) will give a measure of the extent to which mental power has increased or declined during the course of the evening session.

The second point of scientific interest lies in the complete disagreement of the results with those which would have been furnished by a *questionnaire*. All the teachers who helped me except one—men of long experience in day school and evening school work—maintained that the mental capacity of their pupils improved as the evening wore on. I can only suppose that they were misled by the greater *appearance* of interest and mental excitement which, of course, is itself an indication of approaching fatigue; for, in every homogeneous class, the group which worked later in the evening was found to be inferior—where the exercise was hard, very inferior—to the group which worked earlier.

A third point of scientific interest lies in the invention of a method of obtaining definite objective units for the estimation of substance memory. I believe this to be new, and as I have now worked with it for three years with perfectly satisfactory results, I introduced it to the Society with some confidence. It enables us to vary our units according to the synthetic power of the class or group whose mnemonic power we are testing; and this, in my judgment, will have very important bearings when we attempt definitely to correlate substance memory with other abilities.

A fourth element of scientific interest lies in the inference which we may draw as to the nature of fatigue. It is hard not to believe

that, had the later groups worked their exercises at the same time as the earlier groups, they too would have shown continuous improvement. There has been, we must suppose, in *both* cases, a growth in power to do the work, which possibly implies nervous molecular rearrangement; but the second group shows not only no improvement by practice but a falling-off from the standard of their own previous work. It would appear probable from this that fatigue may not imply a lack of the necessary arrangements of actual nervous tissue, but is, as common sense is apt to suppose, a matter of nutrition merely. I cannot say that I feel very confident about this; I throw it out to the Society for discussion.

## 5. A DETAILED ACCOUNT OF THE EXPERIMENTS

### (I.) *With a Class of Young Male Artisans*

These pupils were almost all of them employed at engineering in neighboring works. They attended the evening school to study "workshop arithmetic." The work was not, however, confined entirely to arithmetic, as the exercises given will show. Each lesson in the subject lasted *two hours*, and it was possible for the students, if they desired, to put in per week three evening sessions of two hours each—their average attendance per week was actually about one and one-half sessions.

The experiments were made in the middle of the autumn session of 1908; the weather was good and the attendance quite satisfactory. It is necessary to state that some at least of the local employers offered additional emoluments to students who became proficient in workshop arithmetic; there was, therefore, a kind of indirect compulsory attendance.

The students were divided into two equal groups on the results of an exercise given on November 12, 1908. They began the exercise at 8:30 p.m., just halfway through the session, and were allowed half an hour for working it. No student knew that he was to be required to do this; but the excellent relations existing between the men and their teacher—a young man both discreet and enthusiastic—inspired the students to go at it with a will.

The figures in brackets after the problems show how many marks were given for each. They were decided on by a panel consisting of myself, the teacher, and the headmaster of a boys' school, whose boys were very proficient in arithmetic, but who was not connected in any way with this evening school.

The exercise given was as follows:

1.  $3\frac{1}{2} + 1\frac{5}{8} + 4\frac{1}{10}$ . (5)
2.  $3\frac{4}{9} - 1\frac{7}{11}$ . (5)
3.  $4\frac{9}{10} \div 12\frac{5}{6}$ . (7)
4.  $.01785 \times 87.29$  (any method). (7)
5.  $.03168 \div 4.208$  (any method). (10)
6. A square field contains 1481.4801 square yards. Find the length of one side. (10)
7. Find the value of  $F$  if  $F = \frac{mV - v}{t}$  when  $m = 48$ ,  $V = 60$ ,  $v = -8$ ,  $t = 34$ . (10)
8. A room is 11 feet 6 inches long, 13 feet 6 inches broad and 10 feet high. Allowing 100 square feet for the doors and windows, what number of square yards of paper will be required? (15)
9. A triangular glass with sides of 5 feet, 4 feet, and 3 feet, is silvered. Find the cost of silvering it at 3 pence per square foot (15)
10. A room is 16 feet long, 12 feet broad and 10 feet high. A fly wishes to *crawl* from one bottom corner to the opposite top corner. What is the length of the shortest path by which it may go? (20)

The detailed results follow:

TABLE I

Showing the Individual Results of the Preliminary Exercise

NAME INITIALS ONLY	AGE ON 31/12/08	OCCUPATION	NO. OF MARKS GAINED FOR 10 SUMS WITH A MAXIMUM OF—											TOTAL MARKS	GROUP IN WHICH PLACED
			5	5	7	7	10	10	10	15	15	20			
	<i>Yrs. Mos.</i>														
L. P. ....	16 0	Instrument mounter . . . . .	5	5	7	7	3	10	10	15	7	10	79	A	
T. C. ....	16 1	Instrument mounter . . . . .	5	5	7	7	10	10	15	20	79	79	B		
P. J. E. . . .	19 9	Tool maker. . . . .	5	5	7	6	10	10	10	15	68	68	B		
H. J. ....	19 0	Machine miller. . . . .	4	5	7	10	10	10	7	10	63	63	A		
H. D. ....	22 6	Calibrater. . . . .	5	5	7	7	8	10	15	57	57	57	A		
B. W. ....	17 3	Instrument mounter. . . . .	5	5	7	7	10	10	15	10	64	64	B		
L. H. ....	14 2	Carpenter. . . . .	5	5	7	7	9	10	10	53	53	53	A		
H. W. ....	25 3	Calibrater. . . . .	5	5	7	7	10	10	10	44	44	44	B		
P. A. ....	18 1	Machine miller . . . . .	5	5	5	5	9	10	9	43	43	43	B		
H. G. ....	20 0	Machine miller. . . . .	5	2	6	7	10	30	30	30	30	30	A		
P. S. ....	21 3	Baker. . . . .	5	5	7	12	12	12	12	12	12	12	A		
F. T. ....	15 1	Instrument maker . . . . .	5	5	7	12	12	12	12	12	12	12	B		
F. J. ....	17 10	Butcher. . . . .	5	5	10	10	10	10	10	10	10	10	B		
P. G. ....	15 7	Messenger. . . . .	4	4	4	8	8	8	8	8	8	8	A		
H. J. ....	27 1	Machine miller. . . . .	0	0	0	0	0	0	0	0	0	0	B		
H. S. ....	15 3	Builder's lad. . . . .	0	0	0	0	0	0	0	0	0	0	A		

The students were then divided into two equal groups on the basis of these results.

TABLE II

Showing the Equal Groups

"A" GROUP	MARKS	"B" GROUP	MARKS
L. P. ....	79	T. C. ....	79
H. J. ....	63	P. J. E. ....	68
H. D. ....	57	B. W. ....	64
L. H. ....	53	H. W. ....	44
H. G. ....	30	P. A. ....	43
P. S. ....	12	F. T. ....	12
P. G. ....	8	F. J. ....	10
H. S. ....	0	H. J. ....	0
Total. ....	302	Total. ....	320

We had now obtained not only approximately equal groups, but we had also been fortunate enough to find individual pupils in the two groups who closely corresponded with each other in ability. The first, second, sixth, seventh, and eighth of each group are practically identical, whilst L. H. and H. G. may not unfairly be looked upon as together equivalent to H. W. and P. A. Group B is somewhat the stronger and the older group.

The next exercise was given on December 3. Group A began at 8 p.m., and Group B at 9 p.m. As before, half an hour was allowed for working the exercise. Before and after the exercises the students of both groups did routine work in arithmetic and algebra, but were taught nothing new. The exercise given and results follow:

Exercise given to Group "A" at 8 p.m. and to Group "B" at 9 p.m. on the third of December, 1908:

1.  $6\frac{7}{8} + 3\frac{4}{5} + 1\frac{1}{3}$ . (5)
2.  $4\frac{3}{7} - 2\frac{4}{13}$ . (5)
3.  $8\frac{7}{16} \div 3\frac{4}{15}$ . (7)
4.  $.03576 \times 42.75$  (any method). (7)
5.  $.005581 \div .0672$  (any method). (10)
6. A rectangular plot 150 feet by 24 feet is converted into a *square* plot with the same area. Find the length of one side of the square. (10)
7. If  $R = \frac{E}{C}$ , find  $C$  when  $R = .0287$  and  $E = 2.38$ . (10)
8. Find the expense of paving a pathway 6 feet wide round the outside of a rectangular tennis court 63 feet by 30 feet, at  $9\frac{1}{2}$  pence per square yard. (15)
9. If a man can row 3 miles an hour *against* a stream, the rate of which is  $2\frac{1}{2}$  miles per hour, how far will he row in 6 hours with the stream? (15)
10. Two flies were discussing distances, and one said that if he crawled round a circle which touched a square at each of its 4 corners, it was shorter than going round the sides of the square itself. The other fly said it was not. Which was right? Suppose the square had a 10 foot side, how much farther was it one way than the other? (15)

TABLE III

Showing the Results of the Exercise Worked by Group A and Group B at 8 p.m. and 9 p.m., respectively

NAMES IN "A" GROUP	NO. OF MARKS GAINED WITH MAXIMUM OF—										TOTAL MARKS	NAMES IN "B" GROUP	NO. OF MARKS GAINED WITH MAXIMUM OF—										TOTAL MARKS		
	5	5	7	7	10	10	10	15	15	15			5	5	7	7	10	10	10	15	15	15			
L. P. ....	5	5	7	7	10	10	10	15	15	15	99	T. C. ....	5	5	7	7	10	10	5	15	0	15	79		
H. J. ....	5	5	7	0	10	0	10	0	15	15	67	P. J. E. ....	5	5	0	7	10	10	8	...	12	57			
H. D. ....	5	5	7	7	10	10	10	5	...	...	59	B. W. ....	4	5	0	7	10	10	0	0	...	7	43		
L. H. ....	4	5	7	7	10	10	10	...	...	...	53	H. W. ....	5	5	7	7	10	10	0	...	...	...	44		
H. G. ....	5	5	7	7	10	8	0	...	...	...	42	P. A. ....	5	5	7	7	10	...	0	...	...	...	34		
P. S. ....	5	5	7	7	2	...	...	...	...	...	26	F. T. ....	5	0	7	7	0	...	...	...	...	...	19		
P. G. ....	0	5	7	...	0	...	...	0	0	0	12	F. J. ....	5	5	0	...	...	...	...	...	...	...	10		
H. S. ....	5	0	...	...	...	...	...	0	...	...	5	H. J. ....	0	...	...	...	...	...	0	0	...	...	0		
Total .....												363	Total .....												286

We are now in a position to compare the work done in the preliminary exercise with that done in the final exercises by both groups of students.

TABLE IV

A Comparison of the Work of Groups A and B

NAMES IN "A" GROUP	MARKS GAINED IN FIRST EXERCISE	MARKS GAINED IN SECOND EXERCISE	NAMES IN "B" GROUP	MARKS GAINED IN FIRST EXERCISE	MARKS GAINED IN SECOND EXERCISE
L. P. ....	79	99	T. C. ....	79	79
H. J. ....	63	67	P. J. E. ....	68	57
H. D. ....	57	59	B. W. ....	64	43
L. H. ....	53	53	H. W. ....	44	44
H. G. ....	30	42	P. A. ....	43	34
P. S. ....	12	26	F. T. ....	12	19
P. G. ....	8	12	F. J. ....	10	10
H. S. ....	0	5	H. J. ....	0	0
Totals .....	302	363	Totals .....	320	286

I suggest that this table is remarkable for its regularities and the uniformity of the inferences which we can fairly draw from the work of corresponding pupils.

Not only do the students of Group B do inferior work to those of Group A, but they do less satisfactory work than they did three weeks previously in the preliminary exercises; and that is true not only on the average, but also in every individual case but two; whereas, in Group A, every individual but one improves on his former record L. H. and H. W. stand still; in every other case, the members of Group A go up, the members of Group B except F. T. go down.

The work done at 8 o'clock is 25 per cent better than that done at 9 o'clock; in fact, so great is the mental inability at 9 o'clock that improvement by growth and practice, which we are entitled to infer has occurred, has been completely masked by the fatigue effects.

*(Part II will appear in the February number.)*





## THE CLASS EXPERIMENT.<sup>1</sup>

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*University of Iowa*

There are four ways in which we may teach psychology by experiment: (1) the regular technical laboratory course; (2) the exhibition experiment before a class; (3) the individual experiment without apparatus; and (4) what I shall call the class experiment.

The first of these, the laboratory course, has no place in the elementary course—say a course of five hours for one semester or three throughout the year. Those teachers of psychology who proceed upon the analogy of physical science and begin with the technical experiment are doomed to learn a lesson. My lesson may be summed up in these three propositions: the student is not ready for it; the elementary classes are too large to be handled in that way; and the technical laboratory experiment is worth while only to those who are both capable and willing to take psychology seriously.

The second method, the exhibition experiment, may be used in the widest range; and this is of course the principal method in vogue. It admits of the greatest variety of experiments, it takes but little time, furnishes light entertainment, and is usually approved by the student because it is easier to sit by and see a thing done than to do it. This method with its advantages and weaknesses, we shall probably continue to use for certain purposes; but I am disposed to reserve it for residual experiments which cannot by any means be made effective in the third and fourth types of experiment.

The third type of method, the intensive individual experiment without technical apparatus, is the one which can best be justified by psychological pedagogy. It is a universal principle of invention that, other things being equal, the simpler is the better. This is

<sup>1</sup> Read at a conference on the teaching of psychology, in Chicago, April, 1909.

particularly true in the case of psychological experiments. The simpler the machinery to be manipulated, the better. But of this third method I shall not speak, because some of the merits and possibilities of that plan are set forth in my recently published manual of elementary experiments.

I desire to advocate an extension of the principles underlying this third method into what I call the fourth method, the class experiment. This involves three fundamental principles: (1) every individual student shall take active and responsible part in the experiment; (2) the experiment shall be sufficiently intensive to make it vital; and (3) each step in the experiment shall be explained and interpreted.

I dare say no one will question the pedagogical soundness of these principles. The question will be: Can they be applied? Can we devise class experiments which shall comply with these exacting conditions? I venture to say that, although no considerable number of such experiments are in use, it is possible to develop a series. But granted that it can be done, what will be the gain?

In order to get the situation before us, I shall take an example with which I am familiar, having used it very successfully in this way for several years; namely, the measurement of discrimination of pitch of tones. The problem is to determine the threshold of discrimination with a fair degree of accuracy for each individual in a large class in a single hour.

I have used different instruments, most frequently a set of tuning forks tuned for certain intervals, also a dichord (a very heavy, metal-stringed instrument) or Stern's tone variators. All of these instruments can be heard distinctly in a large lecture room. Each student is furnished with a mimeographed or printed blank which gives form to the record. The intervals are sounded in a definite order according to a key in the hands of the instructor. The student is required always to record H or L according as the second tone in the pair was higher or lower than the first. Usually ten increments are so chosen that they shall include the probable range of thresholds in the class, say from  $\frac{1}{2}$  to 30 vibrations on a standard of 435. Every student has to record every trial but I always begin with the largest increment and take them in the order of decreasing magnitude. When a student has come below his threshold, he must continue by

guessing. After about twenty-five trials, I read off the key and allow each student to check his record. This gives him an orientation and increases his zest for a good record, and the change of work furnishes a needed rest. I am usually able to make about 170 trials in the hour by a modification of the method of right and wrong cases developed specifically for this purpose. This number of trials will furnish satisfactory data for a determination.

At the next hour the method of footing up results is explained. Someone is delegated to work up a report of the results for the class and the full setting and significance of the record is discussed.

In connection with this each student is asked to fill out a blank, which is furnished, containing a series of classified questions that direct his attention to the various elements involved in his musical ability from the point of view of his own observation. If the problem is one of special interest, these questionnaire reports may be collated with the individual records for the class. It is made clear to the student that the measurement may be one of a score or more measurements on his musical ability.

What then is the value of this kind of experiment? There are three elements in the first principle mentioned: (1) that an experiment shall represent individual experience; (2) that the individual shall be active; and (3) that personal responsibility shall rest upon each individual. These are characteristic of a good laboratory course.

In the example just given, each student makes his own observation independently, just as if only he and the experimenter were present. He has most of the advantages of the observation side of the laboratory experiment and is freed from the accessory technique of the experimenter. (Most of the time in a laboratory course is spent in mastering the manipulation of the instruments. Here the student need not burden his mind with that. The instructor does it once for all for each individual in the class.) He must be active every moment, to grasp the directions, to listen, to discriminate and judge, and to record each trial. He must act critically in checking the results. He must make note of peculiarities in his experiences, disturbances, etc. He is responsible for his acts for every moment of the hour. He has to work hard. Students tell me that an hour of such observation is extremely hard work, because the task is new and it is a question of sink or swim at every moment.

This, then, makes a model period of discipline in psychological observation. Instead of seeing or hearing about the experiment, the student does it. Furthermore, he has here to measure his own ability in a capacity which interests him. He will seek to compare his record with norms as to the average ability, the variations with age, sex, training, interest, etc. He will inquire into its practical significance. He will realize that he has gotten at a psychological fact. He is active and warm over the situation so that an abundance of illustrative and theoretical description may be gathered around this bit of systematic experience. He has done one thing well and can now understand how related things may be experienced or done in the same way.

Then with reference to the requirement of intensive work, we have a good illustration in this case. It takes an hour to make a really satisfactory measurement and here the hour is devoted to this measurement undisturbed. The experiment gets a character of solidity and worth. But it would be a failure, unless other intensive features were carried through. I have reference to the working up of the results and the explanations and interpretations of their meaning. The student has to master a method of footing the results. He will work out a measure of the reliability of his record. This reliability-measure is an object of interest in itself aside from the record of his discrimination and is quite as important a psychological fact. Then he has to fill out the questionnaire which by itself teaches him a good deal about the significance of a pitch test and trains him in reporting psychological facts which are so closely interwoven with practical life that he may not have thought of them as psychological whatsoever. Again, the report for the class, the description of the setting of the experiment with reference to related problems and the theoretical discussion of the significance of such a measurement are all germane to the original measurement. These features are simply the carrying out of the intensive idea of doing one thing well.

I have given the experiment a number of years in this way, and have found it an especially attractive and profitable feature in the course, but on account of absence of available literature on the subject, I have been compelled to take a second hour for the directions, computation, description, and interpretation. This could not be done if we should have any considerable number of such experiments. It therefore

seems to me that one condition for the success of such a series is that all the necessary directions, explanations and interpretations must be furnished in print to the student. That text could also include the record blank and the questionnaire.

If this were done, it would be possible to take a single hour for the actual measurement and to give all the rest of the work as a home assignment. It would represent enormous economy and I think that the amount of psychological training furnished in one such hour with the customary preparation for an hour, could well challenge comparison with achievements by any other known methods.

If all these claims are true, the class experiment is worth while. It can be made an artistic, economic and impressive lesson, but of all our devices for teaching, this would require the greatest amount of preparation. In the first place a well adapted set of the apparatus must be put on the market in a good commercial form. In the second place, a psycho-physic method must be designed to fit this particular apparatus and the conditions of the experiment. And in the third place, the explanation, etc., must be well written up. That task is not the task of one individual alone, nor can it be done well at once. Each experiment could very well be delegated to one who has specialized on the subject with years of time to work it up. I have spoken with some confidence about the experiment in pitch because I am spending years, collaborating with others in the attempt to develop the technique, etc., of this particular experiment.

How many such exercises could be introduced depends upon how seriously psychologists would coöperate in this direction. I have thought of several ways in which it could be done. One way would be for one psychologist to attempt, single handed, to enlist such coöperation as would be needed for the production of a manual. Another, and I think a much better way, would be for some general body such as the American Psychological Association to appoint a standing committee of editors of a series of leaflets which could grow and change just as a card catalog grows and changes. This committee could set a model to secure uniformity and fulfillment of fundamental conditions, e. g., each exercise shall be such as can be performed in one hour in compliance with such pedagogical principles as those I have instanced here and the text shall contain record blanks, directions, explanations,

interpretations, etc., enough to make a proper home assignment of two hours, which is the customary time allowed in preparation for a lesson in colleges and universities. It would also contain specific directions to the instructor about the apparatus and method. Each exercise could be printed on the octavo page making about sixteen pages counting the cover. These folders would accumulate into a series and might be sold to the students for five cents apiece or thereabouts. The instructor would then have the opportunity of directing the students to buy, just as text-books are bought, such numbers in these series as are desired and the equipment might permit.

Such a series could be kept perpetually alive. The instructor would select and place sufficient sets of what he desired in the library or the student would purchase only such part of the series as would actually be used in a given year. Each folder would survive or die on its own merits. Revisions and additions would be made continually, under the supervision of the editing committee.

Such a series would embody pedagogical economy and efficiency in at least the following respects: (1) a mastered experiment; (2) time-saving in the home assignment; (3) each experiment bringing the enthusiasm and insight from the chosen field of some investigator; (4) the standard apparatus, and (5) the live, or card catalog feature of the series.

And this is not a visionary scheme. We have the need. We have the spirit of coöperation among psychologists. We have more than a score of psychologists who would be willing to prepare a model exercise of this sort. The cost to the laboratory would be minimal. Such coöperation represents to me the true spirit of the scientific attitude in teaching and it would do much to put the teaching of elementary psychology upon a higher plane.

## COMMUNICATIONS AND DISCUSSIONS

### THE SPELLING OF UNIVERSITY STUDENTS

As a teacher of university classes, both in psychology and education, I have naturally been interested in the mistakes in spelling committed by my students, as these mistakes often throw light upon the nature of the mental processes underlying the use of language, and at the same time indicate in a general way the degree of efficiency of the public school training in spelling. For these reasons I have for several years kept a record of the words most commonly misspelled by members of my classes.

Perhaps I am becoming hypercritical, perhaps my field of observation is too limited, and my "samples" unrepresentative, but I have the conviction that present-day college students spell far less accurately than did those of a decade ago, and I infer that the teaching of spelling in the schools must either be deprived of its proper allotment of time or be conducted by inadequate, if not incorrect methods.

To illustrate this contention, I shall make use of a list of 160 misspellings, culled from 58 examination books written by students of all four classes in a certain western university. For the sake of putting these errors in high relief, I shall assume that a single student is guilty of them all. Let us suppose that he is a senior, clad in cap and gown, brandishing his coveted sheepskin, and that, as his favorite aunt was unable to attend the Commencement exercises, he thoughtfully indites the following epistle in review of his college days and discussion of his future plans:

DEAR AUNT: Today I recieved my diploma, and now, thank fortun, I am educated. I have not yet intirely detirmined my carere. Wheather I shall finaly earn my livlihood by going into the solliciting buisness as my uncle's pardoner will dipind on his perferences. At any rate, laborous and humulating manuel pursuits are furtherest from my intentions, as I am concious allready that the university invironment has proved particularly valuable to me in evry way. My intellegual equipement has been advansed harmonously; by immetation of the best sholars my vocabular has been strenghtened; suberstitions allmost as bad as those of the heathern have been analised and proved incorect to me; my inaetivative has been aroused and intencified; socialy I am well acquiped and incidently the rough eges

I used to show have been eliminated; again, the discipline I have received from the practice work in the laboratories of physics and chemistry, where persistence, courtesy, courageousness and similar qualities are definitely emphasized, and the knowledge I have received from the lectures and discussions of my professors in botany, rhetoric, mathematics, physiology, etc. should be a source of inestimable benefit to me from whatever angle it is regarded. In fact, aunt, until you have been here, you would never suspect how desirable and influential a college education is even to a person who has been given by heredity a merely average amount of rural practicality and a comparatively poor mental caliber. In the light of my practical experience, however, I can testify that a college education is alright.

It is to bad that the epidemic of diphtheria and scarlet fever and the confusion and fuss of fumigation should have involuntarily kept you from coming to the exercises. You inquire about my health: during my course, as you probably remember, I have been ill but seldom; an attack of measles with some nausea and other unpleasant symptoms during the Christmas holidays, and one spell of thrachoma, due, I think, to my astigmatism, are the only diseases I have had, as this is a very intelligent and hygienic city, notable for its cleanliness. One of my friends, however, an engineer, has not had the happiest lot; he lived in a room opposite mine, with a very low ceiling, where transoms were the only devices for ventilating, and even these were ordinarily neglected, as they were of no earthly use. Hence he was unable to brake up an attack of typhoid, and was compelled to loose quite a bit of his school work. They could not trace the source of the disease itself, but put him under quarantine, as they said he might be a nucleus or focus for the development of other cases.

I have to go out now to walk for a peace with my chum, so good-by,  
Your obedient nephew,

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Now, I submit that such spelling as this (and let it be understood that these are bona-fide errors), even when regarded as the summation of the inaccuracy of several dozen students, is totally unwarranted. By hypothesis, college students represent a selected group—selected for their intellectual attainments and capacity to profit by their college training. But ability to spell, like ability to use fluent and idiomatic English, is a well-nigh indispensable prerequisite to culture and to success in practical life. Spelling, to be sure, can scarcely be termed a cultural study; it is rather a tool for the attainment of culture, but it is a most necessary tool. Yet, if one were pessimistically inclined, one might imagine that the average college graduate had never learned the use of this tool.

It will probably be objected that the greater portion of the errors I have produced were accidental, attributable to the haste of examination work. To this it may be replied: first, that I have not included here errors that were of a certainty mere "slips of the pen;" second,



that most of the errors were repeated errors, *i. e.*, that they were committed several times in the paper or by several students; third, that in all my classes I demanded a revision of the papers before they were submitted and placed special emphasis upon the detection of errors in construction and orthography, while in two classes a dictionary was provided for free consultation by the students; fourth, and most important, speaking psychologically, one cannot claim to "know" a word until one can spell that word automatically and correctly, however much one's attention be taken at the time with matters of thought and diction.

In short, the goal in the teaching of spelling should be—ability to write automatically and correctly all the words common in everyday experience, and this goal, obviously, should be attained in the grammar grades. As to the means for its attainment there, it is not my place now to speak, even had I sufficient knowledge to do so. I am told, however, that large numbers of teachers and superintendents have been impressed with a sort of *laissez-faire* doctrine in spelling, have revolted from the old-fashioned drill, and have argued, either that it doesn't matter how one spells, or that spelling will be absorbed incidentally by the "natural-born spellers" and can't be taught to the rest. Still others cling to drill, but the drill is of the lifeless, mechanical, time-consuming sort that has been so justly condemned.

The only way to meet these difficulties is to take the matter seriously and to devote intelligent thought and energy to the teaching of spelling. I cherish the idea that if teachers only knew how to teach, we could attain the goal I have mentioned and could train prospective college students to a higher degree of accuracy than is at present exhibited.

GUY MONTROSE WHIPPLE, PH.D.

Cornell University.

## TWENTIETH ANNIVERSARY OF CLARK UNIVERSITY

At the recent scientific meetings on occasion of the Twentieth Anniversary of Clark University most of the lectures and discussions in the departments of psychology and pedagogy were concerned with subjects in the field represented by the JOURNAL OF EDUCATIONAL PSYCHOLOGY. Lectures were given by distinguished psychologists from this country and Europe, and conferences in regard to the problems of teaching and research were held.

The characteristic marks of recent progress in psychological science are the trend toward useful applications and toward analysis of the more complex mental phenomena. The first of these and in a measure the second also were exemplified in the four lectures of Prof. William Stern of the University of Breslau—himself one of the leaders in the new developments. In the first two the psychology of testimony was taken as the type of applied psychology and the matter was treated with a refreshing reserve and modesty, as though dealing with hopeful beginnings rather than with a perfected method which the legal profession ought instantly to adopt.

Professor Stern's last two lectures dealt with the complicated matter of individuality, especially with the efforts which he and his *confrères* have been making to obtain a systematized scheme for describing and recording—"psychographing"—concrete human personalities. Here no great advance has as yet been possible because of the frightful complexity of the subject. With reference to the connected but less difficult problem of grading children for school purposes according to ability, progress enough has been made to provide a practicable method (that of Binet), a hopeful feature of which is that in the end we may be able not only to separate out the dull and stupid for special assistance, but also to discover those of exceptional endowment and to provide them early with opportunities equal to their powers,—and this not only as a matter of kindness to the child, but of the greatest practical importance for the race, which advances in the paths opened up by its geniuses.

Professor Titchener's first lecture was an historical retrospect upon the course of the science through the last decade; his second, on the psychology of the thought processes, brought out another aspect of the trend already mentioned toward the analysis of the higher mental powers.

The lectures of the other guests of the psychological group—Professors Boas, Burgerstein, Freud, Jennings, Jung and Meyer, served to emphasize afresh the width of the field that psychology claims and the interest and variety of the problems engaging research in its different parts.

Two conferences on the teaching of psychology were held. One, under the chairmanship of Dr. Whipple, discussed the subject of Psychology in Normal Schools; the other led by Dr. Seashore was devoted to Psychology in the College Curriculum.

In the department of education the lectures treated especially school hygiene and mental hygiene; the conferences discussed school hygiene,

research in education, and the training of teachers. The lectures on school hygiene were given by Dr. Leo Burgerstein of the University of Vienna, probably the foremost authority in the world on this subject. The special topics treated were: present problems in school sanitation and the hygiene of instruction, co-education in relation to hygiene, and certain aspects of the fatigue problem. Even to some of those not especially interested in the subject it seems to have been interesting and somewhat surprising to hear such topics in school hygiene as seating and methods of writing discussed in a scientific manner. As Burgerstein's study of work and fatigue in school children reported in his classic paper, on the Curve of Work for a School Hour, read before the London Congress of Hygiene and Demography in 1891, was with the exception of Sikorsky's paper the first extended investigation of fatigue in school children, special interest attached to his résumé and critique of investigations in this field.

Lectures on the Psychology of Association and Mental Hygiene were given by Dr. C. G. Jung of the University of Zürich. In this course Dr. Jung presented and illustrated his *diagnostische Assoziationsmethode*. Interesting as these lectures were for the direct results presented, they were still more significant, perhaps, because they suggested the possibility of establishing a truly mental hygiene based upon scientific principles.

In the educational conferences led by Commissioner Brown, Dr. Dresslar and Dr. Storey, with much diversity of opinion, nevertheless emphasis was placed upon the need of greater attention to school hygiene in courses for teachers and the great importance of research both in education and school hygiene.

Even the lectures in psychiatry given by Prof. Sigmund Freud of the University of Vienna were not without educational and hygienic as well as psychological significance. Special interest attached to these lectures in large part on account of the interesting personality of the lecturer. The correspondent of the New York Nation wrote of him as follows:

. . . . A pupil of Charcot and Westphal, he has developed what may now almost be called a new system of psychology, which seems to a growing number of workers in this field, of whom the writer is one, to be the best word yet spoken there. . . . It is difficult to give, in brief and lucid phrase, any adequate conception of a system that has so many details and even technicalities. It seems certainly to go distinctly beyond Janet; and if it be confirmed, it plays havoc with many of the systems of both philosophical and of laboratory psychology. Some general idea of what it means might be suggested as follows: Dr. Freud does not accept conscious-

ness as the oracle of the soul in any such sense as does modern psychology of the type, e. g., of Wundt or James. More likely, he would say, consciousness never says what it means, but must always be interpreted. It is rather essentially superficial and misleading. It is a compromise between the real nature of the soul and its environment, which is at so many points repressive. Dreams, for instance, are the springing up into consciousness of various undeveloped or repressed remnants of the daily activity, and if the missing links can be supplied, they are not only rational but of the highest interpretative value. Wit is another key to the activity of the submerged self; so are automatic actions, unintended errors of speech, inflection, etc. Freud is the father of the psychoanalysis, one aspect of which has been popularized in this country by Münsterberg in the Harry Orchard case. He is also the father of something very like the hypnoidization of Sidis, which, instead of hypnotizing the patient, asks him merely to sit in absolute quiet and mention whatever thoughts occur to him, which, no matter how apparently irrelevant, are always shown by a little interpretation to be very much in point.

The following specialists in psychology and related subjects received honorary degrees:

Franz Boas, professor of anthropology in Columbia University, doctor of laws.

Hermion Carey Bumpus, director of the American Museum of Natural History, doctor of laws.

Leo Burgerstein, University of Vienna, doctor of laws.

Sigmund Freud, University of Vienna, doctor of laws.

Herbert Spencer Jennings, professor of experimental zoölogy in Johns Hopkins University, doctor of laws.

Carl G. Jung, University of Zürich, doctor of laws.

Adolf Meyer, professor of psychiatry in Johns Hopkins University, doctor of laws.

William Stern, University of Breslau, doctor of laws.

Edward Bradford Titchener, professor of psychology in Cornell University, doctor of letters.

Charles Otis Whitman, head of the department of zoölogy of Chicago University, doctor of biology.

E. C. SANFORD,  
WM. H. BURNHAM.

Clark University.

## THE NATIONAL CHILD CONFERENCE

At the invitation of President G. Stanley Hall a Conference on Child Welfare convened at Clark University, July 6 to 10. As a result of the deliberations of that conference a permanent National Child Conference was organized, which aims to establish in each city a city conference or bureau and in each state a state conference or bureau for the correlation of existing local movements for child welfare. It will further in each locality a survey of all conditions and social movements affecting children, and will endeavor to work out a comprehensive plan for the promotion of the interests of children along all approved lines. These local conferences will seek to strengthen the work of existing organizations, and to cover neglected fields, either by securing an extension of the work of these organizations, or by organizing new committees or associations. As far as finances or conditions make it possible, each local conference will maintain a research department for the investigation of such local conditions as promise practical results for social progress. It will endeavor to present to the local public through the press, lectures, and special bulletins the latest results of scientific child study and the most approved methods of dealing with child problems.

As soon as finances permit, the National Conference may publish a magazine on child welfare, which will seek to formulate comprehensive plans for the solution of child problems in each locality. It will popularize the latest scientific study of children and summarize the progress made by child welfare organizations.

Each year a National Conference on Research and Welfare will be held, to which all child-helping agencies will be asked to send representatives. At this meeting the status of each of these movements will be presented and the results of the most significant studies of children will be reviewed. It is deemed desirable that the National Conference should also establish either a summer school or a permanent school for the training of practical workers for the various child-helping movements in order that those who undertake the work may be equipped with a more fundamental knowledge of these movements, may have a better understanding of child nature, and may be more familiar with the methods of investigating children's problems.

HENRY S. CURTIS.

Worcester, Mass.

### THIRD INTERNATIONAL CONGRESS FOR HOME EDUCATION, BRUSSELS, AUGUST 21-25, 1910

While the significance of the home in the formation of character has never been questioned, the important task of organizing the forces of home education and capitalizing the most valuable results of experience and investigation in this field has only recently been undertaken. This movement, world-wide in its extent and significance, was initiated by the Belgian government, and bore its first fruit in the International Congress for Home Education which convened at Liège in 1905. A second congress was held in Milan in 1906, under the patronage of the Italian government.

These two congresses have shown the very great value of a persistent and systematic study of the problems involved in home education. The published Proceedings fill a unique place in educational literature and form the nucleus about which the future science of home education will develop. It is, therefore, gratifying to note that the movement has been given another forceful impetus by the calling of a Third International Congress for Home Education to convene in Brussels August 21-25, 1910. The congress will be held under the patronage of the Belgian government, and in connection with the Universal Exhibition of Brussels.

It is expected that the programme will lay especial stress upon the problem of preventing, through a proper direction of early education in the home, the development of the unsocial and otherwise inadequate standards and ideals which so often take root in a neglected or poisoned soil. As the preliminary circular of the congress says:

The greater part of the efforts of those who seek to correct defects, to relieve distress, and to rectify mistakes, are not successful because they are undertaken too late.

The congress will consist of five sections

Section 1. The study of childhood.

Section 2. The education of children; (a) general questions; (b) the education of children by their parents in the home; (c) coöperation of the family with the school; (d) education in the home after school.

Section 3. Abnormal children.

Section 4. Various subjects relating to childhood.

Section 5. Documentation.

An American Committee has been appointed at the request of the Belgian government by Hon. E. E. Brown, United States Commis-

sioner of Education, to stimulate interest in the work of the congress. This committee has organized a number of sub-committees, each representing one of the sections of the congress. An effort will be made to secure a large American representation in the sessions at Brussels.

Membership in the congress entitles to a copy of the Proceedings. The membership fee is \$2, and may be sent either to the General Secretary, 44, rue Rubens, Brussels, or to the Secretary of the American Committee.

Administrations, educational bodies, philanthropic societies, can take part in the congress and be represented by a delegate. A subscription must be paid for each delegate.

Those who subscribe not less than \$10 become honorary members. Subscriptions of this type are needed to defray the general expenses of the propaganda.

Papers and discussions may be presented in any of the following languages: French, German, English, Dutch, Italian and Spanish.

Americans wishing to participate in the discussions of the congress should communicate with the Secretary of the American Committee, W. C. Bagley, Urbana, Ill.

## ABSTRACTS AND REVIEWS

ERNST MEUMANN. *Vorlesungen zur Einführung in die experimentelle Pädagogik und ihre psychologischen Grundlagen.* (Leipzig: Engelmann, 1907. Vol. i, pp. xviii, 555 and vol. ii, pp. viii, 467.)

Educational research is manifesting at the present time three important tendencies, the study of social and moral education, the employment of statistical methods, and the application of the methods of experimental psychology to educational problems. Professor Meumann's two volume work is the most valuable and complete contribution made thus far to the last of these three tendencies. He has brought together in a systematic way the investigations in this field and designated them as experimental pedagogy or education.

The writing of the treatise was occasioned by lectures which the author delivered to several teachers' associations in Germany. The work embraces the following main topics.

Lectures I and II state the function and problems of experimental education. Its function consists in giving the educator a factual basis for his pedagogical principles.

Lectures III to VII deal with the development of the child. The first of these lectures is devoted to a summary of the more familiar facts about physical growth, while the other four lectures consider the development of the different mental capacities. After defining the meaning of general and specific capacities the author proceeds to trace the growth of attention, pp. 76-94; of perception and discrimination, pp. 95-124; of apperception and the range of ideas, pp. 128-169; of memory, pp. 170-203; of thinking and imaging, pp. 204-256; of speech, pp. 257-274; of emotion and volition, pp. 275-311.

In connection with each topic the author describes and criticises the various experimental methods that have been employed by different investigators and then summarizes the results and their educational bearings. Particularly worthy of mention are the excellent analyses of mental processes and the relative evaluation of various experimental methods. The results, however, are not as exhaustively summarized as the reader might desire. Important researches are occasionally



omitted or barely mentioned. This may possibly be excused on account of the lecture form of the book.

Lectures VIII to X are concerned with mental ability (*Begabungslehre*) and individual differences. Meumann defines the concept of individual differences and describes the types of individuals with respect to thinking, imagery, attention, apperception, and mental deficiency. Here again the critical analyses of the methods of determining types and of measuring mental ability are especially valuable. As an illustration may be mentioned the exhaustive outline of the different ways of determining types of imagery in thinking, pp. 451-484. The practical bearings upon education are usually stated conservatively.

Lecture XI considers the mental work of the child, including methods of measuring mental work, economy of learning, conditions of practice, etc.

Lecture XII is on the mental hygiene of school work, including a full discussion of the means of measuring fatigue.

Lectures XIII to XVII are devoted to the more practical problems of school exercises. The first of this group of lectures points out the relation between experimental education and school instruction. The other four lectures deal respectively with reading, writing, arithmetic, and drawing. The psychological factors in each are analyzed and the methods and results are summarized together with their pedagogical applications.

The final lecture gives a general survey and a prospectus for further educational research. A bibliography, classified according to the topics of the lectures, is added at the end of each volume. The second volume also contains an index.

In the writing of this treatise, Professor Meumann has rendered a distinct service; for the student of educational psychology, on the one hand, he has presented an outline of the results of investigations and their practical import; and for the investigator, on the other hand, he has analyzed the problems and discussed the experimental methods of approaching these problems.

DANIEL STARCH.

University of Wisconsin.

HUGO MÜNSTERBERG. *Psychology and the Teacher*. (New York: D. Appleton and Company, 1909. Pp. 329. \$1.50.)

This is perhaps the most notable book on education since James' *Talks to Teachers*, but, unlike that, it seeks in outline to cover the whole field of instruction. Part I treats of the ethical aims of education, Part II of educational psychology, and Part III of practical applications in the schoolroom.

The two most striking features of the treatment throughout are, first, concentration upon a few central themes, and second, lucidity of exposition. The book is not designed to render the remainder of our educational literature superfluous, but to furnish perspective, and a guide to values.

The leading theme of Part I is that, not pleasure, but abiding ideal values must constitute the aim of education. In unfolding this conception, our author has surpassed even his own attested power of transparent exposition, so that he leads the novice in thinking up into the heights of ethical theory without allowing him to suspect that the atmosphere has become rare.

Beginning with a clear distinction between facts and purposes in Ch. II, and continuing in Ch. III with a demonstration of the ethical worthlessness of pleasure as an end of conduct, the author pricks some pretty bubbles, such as the idea that we shall ever find the true aims of education in the impulses or desires of the child, or truly educate him by catering blindly to his so-called "interests" alone. Only the eternal ideal values that make truth what it is, give unity and harmony to what we call the beautiful, or that render worthy the conduct we pronounce moral, are to be accounted the true purposes of education.

In Ch. XI the author discusses anew the antithesis which he pointed out some years ago between the analytical methods of psychology and the synthetical nature of the teacher's natural sympathy toward the child. The antithesis, he declares, has not been overcome, but psychology has now at least a few facts which can be helpfully applied by the teacher in his daily work. In the Preface, we are warned that the author has not changed his mind on this point: it is the science of psychology that has changed. One may easily grant that the science has been enriched during the last ten years, and that our author thinks that his disposition, insight and point of view have remained just where they were, and yet maintain with some show of reason that the so-called antithesis is more imaginary than real, since other professions have no

difficulty in preserving their humanity while applying their science, and one may be even haunted by the suspicion, while reading the discourse on educational psychology, that our author might, so far as the actual science itself is concerned, have said the same things ten years ago. However, as the novelists say: "this is a detail." We are none the less grateful that the book has at last arrived.

It is impossible in a review so brief as this must be to comment upon the many excellent things presented in the chapters on Mind and Body and The Biological Aspect, but what the reader has a right to expect is some notion as to what our author thinks psychology now has to offer to the teacher. It will, perhaps, suffice to select a single chapter, that on Attention, as a sample of the whole. In briefest outline the contents of the chapter are as follows:

The aim of attention is always the same, a fuller and richer insight into the material in hand. All bodily movements and states contribute to this end, and the process is the same, whether we attend to outer objects or to inner states. Attention neither approves or disapproves: it seeks to find out.

There are two sides to attention, not only tension to get an effect, but a suppression of all impressions not at the focus of attention. The nervous system is arranged to inhibit contrary solicitations. The channels of motor discharge leading into them are blocked: otherwise attention would be impossible. Ideas become vivid that find an open way, but ideas are suppressed whose way is blocked. This explains attention.

Internally there is a five-fold happening: (1) that becomes vivid to which we attend; (2) that to which we attend becomes clearer (vividness, which belongs to a unit, is to be distinguished from clearness, which is a grasping of the various parts of a manifold); (3) the object of attention develops under attention, becomes the center of associations, assumes new fringes of meaning, etc.; (4) all that leads away from the object of attention is suppressed, inhibited, and (5) we feel ourselves to be in an adjusted activity.

But growth in attention has narrow limits, for fatigue soon sets in, and thus serves as an automatic correction to excess. This fatigue gives scope at once to opposite and suppressed reactions. Attention wanders, rivalry appears and new ideas become vivid. This explains alternation in attention.

When an impression opens the channels through its own power, we

speak of involuntary attention, but this has small educational value. The great demand is for active attention.

The teacher must ask what factors make for vividness, clearness, and self-development in ideas, what to suppression and inhibition; what secures prolonged attention, what limits it. He must also discover the individual differences among his pupils, and how to treat them; how the child's attention differs from that of the adult; how it must be trained; how it changes with training, etc.

There follow many excellent suggestions for the guidance of the teacher in utilizing the foregoing distinctions. Thus, for example, it is pointed out that, though the sudden stirring up of attention is easy, attention so secured is of trifling value; that forced attention to uninteresting material may be equally undesirable; that to secure prolonged attention there must be a certain richness and variety in the external object, reënforced by richness of internal experience and knowledge; that the teacher should merely aid the pupil to find significant associative connections, not supply them ready-made, to the end that the pupil may acquire the power to attend; that motor responses and attitudes which favor attention are in a measure open to training; that children exhibit marked individual differences in attentive capacity; that all children must be trained in voluntary attention, etc.

Not all chapters are so fully treated as this: that on Will and Habit, for example, seems almost painfully meager. But perhaps it is because so much has been said elsewhere on this topic that our author passes over it so lightly. So far as will is concerned, it is reduced to ideo-motor action, while still less is said about habit.

The third part of the volume, which is devoted to the work of the schools, its instruction, studies, organization, etc., is full of happy and discerning suggestions, yet it is the least important and perhaps the least needed part of the discussion. The limits of the present review forbid any attempt to exhibit its contents.

Of the whole book it may safely be said, it will receive a warm welcome, and owing to the writer's widespread reputation and his manifold writings in the allied fields of medicine and law it will have a wide use. It is a good day for education when our ablest psychologists think it worth while to point out the value of psychology in the instruction and training of the young.

CHARLES DEGARMO.

Cornell University.

EDWIN A. KIRKPATRICK. *Genetic Psychology*, (New York: The Macmillan Company, 1909. Pp. 370.)

This new book by Professor Kirkpatrick is a valuable contribution to the study of the evolution of mind. It should prove of special value to teachers of psychology in normal schools, and colleges, to serious students of the psychological basis of education, and in general to those students who are interested in the development of mind from the lowest to the highest forms of its manifestation.

Like the author's *Fundamentals of Child Study*, this volume is much more readable than most books in its field. It abounds in concrete illustrations and so gives the ordinary reader sufficient basis for the generalizations drawn. It will prove valuable too, for many, in summing up in accurate and trustworthy fashion, much of the best that has been published on the subject of the evolution of mind as considered from the author's point of view.

The author's general point of view, which is to be set forth in greater detail in an early number of this journal, is one that will especially appeal to those practical persons who have the applications of psychology more or less definitely in mind. In fact the author's stated purpose is, at least in part, the tentative formulation of the facts and principles of genetic psychology for the use of educators. The references given at the end of each chapter are carefully selected, and should greatly aid in guiding the student who desires to extend his knowledge in this field. One of the commendable features of the book is the vital correlation between the physiological and the psychological. Where physiological basis of mental function is given, the author succeeds in making the functioning clear and illustrative.

After he has indicated the general point of view of genetic psychology, and emphasized the fact that the development of mind must be revealed largely through a comparison of the higher animals with the lower on the assumption of a continuous development, Professor Kirkpatrick states that genetic psychology is interested mainly "in comparing and grading the intelligence of animals only as a means of knowing what changes have taken place in the evolution of mind in the race, the order of such evolution, and the relation to each other of different types of activity." To determine these changes one must depend upon an analysis of (1) structure, (2) behavior. On the basis of these two, one can draw inferences regarding conscious states, but here there is need of constant care lest one assume behavior to be conscious when such

assumption is quite unwarranted. He then discusses in a general way the characteristics of organisms, and the evolution of behavior and of mind. A chapter is given to the structural basis of behavior, and numerous facts are cited illustrating the specialization of sensory-motor organs in the lower forms of animal life.

Three chapters on behavior follow. Types of Animal Behavior are illustrated by the characteristic reactions and activities of the amoeba, paramecium, hydra, starfish, mollusca, crustacea, fishes, frogs, tortoises, ants, guinea pigs, white rats, raccoons, monkeys, etc. Instinctive behavior is then summed up in one chapter, and a third chapter is devoted to Behavior of Individuals as represented in the acquisition of habits and ideas.

The writer then turns to a consideration of the *structure concerned in these more complex forms of behavior and in ideation*. By comparison of the nervous system of man with that of lower animals the parts especially characteristic of man have their functions indicated. In general the nervous system of man may be considered as like that of the higher mammals, but with considerable portions specialized for the performance of more complex functions. For example centers slightly, if at all, represented in the brains of lower animals are (1) those concerned in forming images of things; (2) those concerned in the production of word or symbol images; (3) those concerned in the formation of concepts and in the processes of abstract thought.

The author then treats of the physiological basis of perception, imagery, conception, attention and thought. Having thus described behavior and mental processes in objective terms, Professor Kirkpatrick turns his attention to conscious states. He sums up the tests and objective indications of consciousness and intelligence under (1) structure, (2) behavior, and then, starting with the facts obtained by introspection, attempts to infer from our own mental states, what the mental states of less highly developed minds may be.

The next chapter is devoted to *specific conscious states*, for example, the character of feeling in animals, pain, sensations, perceptions, images and memories, concepts and reasoning, and volitional activity. This clears the way for the consideration of *types of adaptive activity or intelligence*. Intelligence is conceived in a broader sense than usual, namely, as including all adaptation of means to ends, both conscious and unconscious. This broader conception seems desirable "in order that psychology, physiology and biology may have a common ground for the consideration of behavior."

It is, to be sure, somewhat startling to hear the author speak of "physiological intelligence," and to hear him discuss it as belonging in the same series with sensory-motor intelligence, representative intelligence and conceptual intelligence. We are assured that when we view intelligence in an entirely objective way, as the adaptation of means to ends, we find good reason for looking upon physiological processes as highly intelligent. For instance, "As a builder, physiological intelligence is not surpassed by the greatest mechanic or architect . . . Discriminative and selective activity, which chooses from the various substances introduced into the body, just the right elements for the building of each organ, is certainly comparable in accuracy to the perceptive judgment of the human builder." Again, "No heat-regulating device as yet invented by man will keep a building at a temperature so nearly uniform, amid rapidly changing external conditions, as is the temperature of the body, maintained by physiological intelligence." All this seems like an unjustifiable stretching of the word intelligence beyond its proper and recognized meaning.

Then follows a valuable chapter on the four Types of Learning Activity corresponding to the four types of adaptive activity indicated above. The importance of the early formation of good physiological habits is suggested by a variety of facts. For example the greater effectiveness with which the brain works at different parts of the day is doubtless due, at least in part, to the circulatory habits that have been established. Sobriety, cheerfulness, mental quickness, etc., have a similar physiological basis. The chapter also contains some valuable suggestions for educators as to the *nature* of the value of manual training, and the significance of the gap between theory and practice, as illustrated by the floundering of the college student for the first year or two after leaving college. There are also implications as to the teaching of elementary reading and number.

The final chapter sums up racial and individual development from the biological and the social points of view, and emphasizes the fact that the present human environment is much more psychic and social than merely physical, and that conscious selection now largely replaces natural selection.

B. R. SIMPSON.

Brooklyn Training School for Teachers.

WILLIAM H. ALLEN. *Civics and Health*. With an introduction by William T. Sedgwick. (Boston: Ginn and Company, 1909. Pp. xi, 403. \$1.25.)

This book should be read by every superintendent and teacher, both because it is the most stimulating and forceful presentation of the need, the right and the duty of good health that has appeared, and because it pays special attention to the function of the teacher in the promotion of health for the individual and for the community. Although not intended for a text-book in school hygiene, it would form an excellent basis for discussion at gatherings of teachers, and it is an ideal book for home reading.

In Part I (Health Rights), good health is shown to be not only a source of personal happiness and profit, but also a civic obligation, and it is further shown that the physical welfare of school children affords the best and clearest "index" to the degree to which health rights are realized.

In Part II the way in which this "index" may be "read" in the classroom is discussed: here are treated mouth-breathing, contagious diseases, eye strain, ear troubles, dental sanitation, and allied school defects and infirmities, together with the health of the teacher himself and the health value of play and physical training.

Parts III and IV discuss the best methods of coöperating to meet health obligations and of organizing efficient machinery for guaranteeing health rights. Here Mr. Allen insists upon the enforcement of existing laws and the utilization of existing agencies. He believes that in America the school authorities should improve conditions by "getting things done" rather than by "doing things," as is the tendency in Europe. School eye and dental clinics, school surgery, free school lunches are not the best possible remedies, for "if parents, hospitals, dispensaries, and charitable societies will attend to children's needs, then relief at school is unnecessary, even though it may seem desirable" (p. 185), and "getting things done will leave the school free to concentrate its attention upon school problems" (p. 189).

Teachers will feel special interest in those of the concluding chapters that deal with "heredity truths and heredity bugaboos," instruction in sex hygiene, the element of truth in mental cures, and with the best methods of combatting the tobacco and alcohol evils. The author argues that the only proper course is to tell the exact truth about these evils, without exaggeration, and to teach "that the strongest reasons for



total abstinence are social and economic, and industrial, rather than individual and physiological."

This book is supplied with numerous attention-compelling illustrations, with a number of well-chosen statistical tables, and with several "questionnaires" that the teacher may apply to the community, school-house or classroom in which he lives and works. The text also abounds in pithy statements that challenge acceptance and stimulate interest. In illustration and in order to make clearer the scope and type of the work, I cite a number of those that have most impressed me. "Many a rural school violates with impunity more laws of health than city factories are now permitted to transgress" (p. 142). "School teachers are frequently 'sweated' as mercilessly as factory operatives" (p. 152). "To remove physical defects, causal conditions among all income classes should be treated, and not merely symptoms revealed at school by children of the so-called poor" (p. 170). "The school should pronounce the child's fitness to leave school and to engage in work" (p. 198). "The cost of exterminating it [tuberculosis] will be but a drop in the bucket if school-teachers do their part this next generation with the twenty million children whose day environment they control for three-fourths of the year, and whose habits they can determine" (p. 245). "Physiological age should influence school classification and school curriculum" (p. 289). "The deficiencies of infants are infinitesimal compared with the deficiencies of the world with which we surround them" (p. 342). "Class instruction in hygiene is practicable for all matters pertaining to normal sex health" (p. 388). "To stimulate a child's imagination by untruths about alcohol is as vicious as to stimulate his body with alcohol" (p. 357). "Unhygienic living and mind cure cannot go together" (p. 394).

In negative criticism there is little to be said. The present writer would prefer a more systematic treatment. He has, also, found certain pages confusing, e. g., Chapter XVI, the import of which is not clear until the following chapter has been read. In Chapter XIII Mr. Allen appears to regard the ergograph as a trustworthy device for measuring the diurnal curve of efficiency in the schoolroom, although the validity of this method has been seriously questioned, if not altogether negated, by the work of Ellis and Shipe and several other investigators.

G. M. W.

W. H. HECK, *Mental Discipline and Educational Values*. (New York: John Lane Company, 1909. Pp. vi, 147.)

Professor Heck, of the University of Virginia, has done a valuable service in condensing within the compass of this small volume the most important results of the recent studies of formal discipline. In a short introduction, he pleads for a more vital recognition in educational practice of the modifications of the doctrine that these studies have necessitated. This is followed by a brief historical survey, adequately illustrated by excerpts from the literature. A third chapter discusses systematically the non-experimental evidence against the validity of the doctrine in its older form. Following this, the experimental literature is succinctly summarized, while a fifth chapter takes us into the realm of cerebral physiology, and concludes with the assertion that the theories of cortical localization "are sufficient in themselves to disprove the doctrine of formal discipline." Chapter VI, however, goes on to prove that a transfer of training may be accomplished through the development of "general concepts of method," thus making possible a realization of the aim of the older disciplinarians, albeit by a method that has only recently been explicitly recognized. Chapter VII outlines the author's theory of "specific disciplines," and Chapters VIII and IX apply his conclusions to the elementary and secondary curriculums, respectively.

It is safe to say that this book will be warmly welcomed both by teachers of education and by practical schoolmen. In fact, the systematic analysis of the literature is sufficient in itself to justify the publication. Especially valuable, however, is the clear-cut account of the possibilities of transfer through general concepts of method. Although this solution of the problem is suggested by nearly all of the recent studies, it has not been so well developed as in the present volume, and whether one agrees with Heck that this is the only means of transfer, everyone must agree that it offers the most helpful suggestions for the educator.

The author's general recommendations for the realization of the disciplinary values are formulated in what he terms the "theory of specific disciplines." He would choose the materials of the curriculum largely upon the basis of their intrinsic values, and he gives little credence to the popular belief that some subjects are better adapted for disciplinary purposes than are others. General concepts of method are to be derived from specific methods, just as any general concept is to be

induced from the particulars upon which it must rest. "The common elements of a number of specific methods are abstracted and bound together in a general concept of method, a general rule or principle of how to do, how to act, in situations of a certain general type" (p. 94). The elementary school, he contends, need be little troubled by these general concepts of method, because the pupil in this stage of his education is not ready for "such conceptualizing." "Therefore the mastery of particular methods, of special forms, is the methodological aim of the elementary school, and this means, of course, particular methods of the most comparative value in relation to particular subject-matter of the most comparative value" (p. 136). In the high school, however, "studies have a general-method value in addition to the value of their specific subject-matter and method." The most wasteful weakness in high-school teaching, we are warned, lies in the failure to work out and apply general concepts of method. The discussion of the general concepts to be derived from high-school subject-matter is especially good.

There are some parts of the book, however, that are less satisfactorily treated. The neurological evidence against transfer, for example, is very far from convincing. Until neurologists themselves are better agreed as to the function of the cortical areas, and especially as to the relation of these areas to mental activity, the educator will probably do well to view with some distrust inferences that are drawn from hypothetical functions. Again, the contention of Ebert and Meumann that there is a factor in transfer over and above the bringing into clear consciousness of the method of procedure needs rather more detailed and critical consideration than Professor Heck accords it. The assumption that the elementary school is not important in building general concepts of method has not as yet a satisfactory basis in experimental tests. In the reviewer's opinion, there is a strong probability that the specific training of childhood may be made to issue in general attitudes or prejudices that fulfill the same function as the logically-developed concepts of method. Finally, Professor Heck minimizes the importance that other writers have given to the emotional element in the effective formation of concepts of method. But certainly he would not deny that the concepts of scientific method, for example, can be more readily transferred from the high-school laboratory to the situations of later life if the pupil has a strongly emotionalized *belief* that the scientific method is really "worth while." Merely recognizing from the point of view of intellect that the scientific method involves

unprejudiced observation and careful induction is one thing; *feeling* the worth of this method as the best known means of attaining truth is quite another.

W. C. B.

H. W. CHASE. *Some Aspects of the Attention Problem*. Pedagogical Seminary, September, 1909, 16, 281-300.

L. R. GEISSLER. *The Measurement of Attention*. American Journal of Psychology, October, 1909, 20, 473-529.

Chase prefaces his review of the theoretical and experimental study of attention by a few remarks upon the genetic and the structural points of view. He defines attention, with Titchener, as "the process by which, psychically, ideas become clear." In his review of measurements of attention he follows Pillsbury's distinction of three methods, and concludes that all these methods have so far been unsatisfactory. This, he says, "does not seem so strange as clearness is at best a slippery concept." He forgets, however, that most of the authors that he cites did not attempt to measure "the degree of clearness of an idea," but worked with some other characteristic of the attentive consciousness. Meumann's list of seven pairs of attention types he rightly reduces to three phases or moments of attention, viz., "differences in degree of concentration, in quickness of adaptation, and in duration of concentration." Among children, individual differences in these phases are less clearly marked; nevertheless, pedagogy must not neglect such differences, especially those among pupils of the same age and grade. The conditions and effects of attention, our author thinks, have been carefully studied, and uniform conclusions have been reached as to their nature. On the other hand, in spite of the large number of authors who have investigated the matter, a considerable uncertainty still exists with regard to the relations of attention to other mental functions. For instance, Binet and Consoni seem to find a correlation between quickness of adaptation and degree of intelligence, but Winteler's results are negative. Again, Griffing and Winteler agree on the concurrence of general intelligence and a wider attention-span. Binet and Simon's positive results were confirmed by DeCroly and Degand, whose tests of intelligence involved all three characteristics of attention. [The name of the latter author has been persistently deformed by Chase, and,

in general, his bibliography of 69 items shows many errors in titles and names, *e. g.* J. Whipple for G. M. Whipple, "*Anwendung der Schulkindern*" for "*Anwendung bei Schulkindern*," *testes* for *tests*, etc.] In all the other studies of general intelligence to which Chase refers, attention, in one or all three of the phases mentioned, has been found to play an important rôle, yet no uniform conclusions can be reached. Similarly, the possibility of training attention has not been demonstrated, nor, in his opinion, is there more than a limited possibility of such training.

A month after the appearance of Chase's article in which he deplored the fact that no satisfactory means of measuring the attention had been found, there appeared the present writer's article in which this very problem is attacked.

The writer first gives a critical and systematic study of previous views concerning the nature and number of degrees of attention, classifies the various means of inducing variations of attention, and discusses those experimental investigations in which the attempt had been made to measure degrees of attention. He next describes three methods of his own for measuring attention, and exhibits the results obtained thereby.

In the first method, he attempted to correlate precision of mental work in continuous adding with muscular rigidity or motor inhibition. Variations of attention were induced by such distractions as an electrically driven tuning fork, an electric bell, a metronome, or a flicker moving across the field of vision. The observer, with his right hand, exposed numbers, one after another, as fast as he could add them, announcing each individual sum aloud, while with his left hand he held a plethysmographic handle. After each experiment he estimated his degree of attention to the adding. The experimenter checked off the correctness of each individual sum and registered its time on a kymograph. The results gave a positive coefficient of correlation of .60 between: best, good, average, bad, or least attention as introspectively estimated, and quickest, quick, average, slow, and slowest rate of work as objectively calculated. The plethysmographic curves that registered muscular rigidity, proved, however, to be non-significant.

In the second method practically the same experimental conditions prevailed, but the observers now estimated their variations of attention in terms of degrees of clearness (in the first method no particular criterion had been prescribed). For this purpose they had constructed for themselves in especially designed preliminary series an ideated scale of nine clearness-degrees, ranging from maximally clear to absolutely

obscure. The addition tests were of uniform difficulty, and the previous distractors were used in all possible combinations in order to increase their effectiveness. Nevertheless these distractors could not reduce the observers' attention to his adding below the fourth or fifth degree of clearness.

In the third method, the observers marked little red circles appearing successively and at a quick rate in horizontally varying positions that were exposed step-fashion by McDougall's memory apparatus. In some of the experiments the circles appeared among eight letters, digits, or small colored discs, all arranged in horizontal rows. In others the marking had to be done while the observer spelled difficult phrases or recited lines of poetry. By thus varying the stimulus patterns with the circles, or complicating the task of marking, or by voluntarily directing the attention, now to the circles, now to the letters, digits, or colors, and now to spelling or reciting, all possible degrees of clearness of marking the circles were obtained. After each experiment the observers were asked to estimate both the degree of clearness of the various mental processes involved, and the degree of accuracy in marking.

The following are the main conclusions: (1) A very close parallelism was found to exist, in both the second and third methods, between introspectively distinguished variations of attention and corresponding differences in the precision of work performed at these levels. (2) The introspective estimation of the quality of work was not as reliable as the evaluation of the degrees of attention. (3) The degree of concentration does not depend so much upon the nature and number of distractions, as upon the nature and complexity of two simultaneous tasks and the preliminary instructions regulating adjustment and direction of attention. (4) There seem to be two types of the attentive consciousness, (*a*) the dual-division, in which a unitary group of mental processes occupies the focus of greatest clearness, while another, simultaneous group constitutes a vague or obscure background, and (*b*) the multi-level formation, in which processes occur whose clearness is intermediate between that of the focus and the background. (5) In the dual-division type of attention a reciprocal relation exists between focus and background, that is, the clearer the former, the obscurer the latter, and conversely.

L. R. GEISSLER.

Cornell University.

## NOTES AND NEWS

Dr. Irving Elgar Miller, author of *The Psychology of Thinking*, and formerly of the Milwaukee State Normal School, has been appointed professor of psychology and director of research work in the Colorado State Normal School.

Lewis F. Anderson (Ph.D., Clark), for ten years instructor in psychology and education in the Marquette (Michigan) State Normal School, has been appointed assistant professor of education in the University of Illinois.

The semi-annual meeting of the Illinois Schoolmasters' Club, held in Peoria, October 8 and 9, was given over to a discussion of the doctrine of formal discipline. Prof. S. S. Colvin, of the University of Illinois, opened the discussion with a summary of the experimental and critical literature, followed by a constructive interpretation of the doctrine. President David Felmley, of Normal, and Professors Judd and Butler of Chicago were also among the speakers. Professor Colvin's paper has been issued as a bulletin by the School of Education, University of Illinois, and will be reviewed later in this JOURNAL.

The teachers of psychology in Iowa have organized a state association for the immediate purpose of conferences in regard to the teaching of the psychology which is required for the state teachers' certificates. The first meeting will be held at the State University during the Easter recess.

Capt. John L. Shepard, of the Medical Corps, U. S. A., Fort Logan, Colo., is investigating the feasibility of adding one or more mental tests to the usual physical and medical examination of men who apply for enlistment. It is hoped in this way to detect and to eliminate before enlistment those men whose mental ability is so deficient as to render them incapable of the proper discharge of their duties as soldiers. The present mental examination demands only ability to read and write and to tell right from left.

The University of Chicago has established, in connection with the

School of Education, a laboratory for the study of educational problems. The *School Review* says of this laboratory:

The equipment . . . will in some respects resemble the equipment of a psychological laboratory, but there will be special devices for investigating writing and reading and the other forms of mental activity which are developed in school work.

William Bishop Owen, for several years associate professor of education in the University of Chicago and dean of the University High School, has been appointed principal of the Chicago Normal School to succeed Mrs. Ella Flagg Young.

Mr. G. N. Gilbertson has been appointed instructor in psychology at the University of Colorado. He will take part of the work of Professor Henmon, who is acting dean.

Dr. C. Lloyd Morgan, F. R. S., well known for his works on animal behavior and his *Psychology for Teachers*, has resigned the office of vice-chancellor of the University of Bristol after a term of service of twenty-two years. On the occasion of the acceptance of his resignation the Council of the University placed on record its sense of the distinguished service rendered by him to the cause of university education during this period.

Dr. E. H. Henderson, professor of education and psychology at Adelphi College, Brooklyn, N. Y., has been transferred to the chair of philosophy in that institution.

At Clark University a Children's Institute has been established for the scientific study of the physical and mental nature of the child. Among the departments already organized are the library department under the head of Dr. Theodate L. Smith, the department of hygiene in charge of Dr. Wm. H. Burnham, the department of experimental pedagogy presided over by Dr. Mary Tanner, and the department of religious and moral education under the supervision of Dr. Arthur Conklin. President G. Stanley Hall is the Director of the Children's Institute.

Dr. Naomi Norsworthy, instructor in educational psychology at Teachers College, Columbia University, has been made adjunct professor of educational psychology in that institution.



We note with satisfaction the appointment of Dr. David S. Snedden, adjunct professor of educational administration in Teachers College, Columbia University, as Commissioner of Education for the State of Massachusetts. Dr. Snedden will have the supervision of all the state educational institutions, including the normal schools, and one of his first tasks will be the establishment of the new state system of industrial education.

Dr. E. C. Sanford, professor of psychology in Clark University, and one of the leading experimental psychologists in America, has been appointed President of Clark College.

Dr. E. B. Huey, professor of psychology in the University of Pittsburgh, who has been spending the past year in Paris in the clinical study of mental defectives, has been placed in charge of the newly established department of clinical psychology at the Lincoln State School and Colony, the state institution for the feeble-minded, Lincoln, Ill.

Dr. J. Mark Baldwin, formerly head of the department of philosophy in Johns Hopkins University, is spending the winter in Paris. Dr. Baldwin has been advising the Mexican Department of Education in the reorganization of the state system of education, and will assist at the opening of the Mexican National University in September, 1910. He states that the rumor of his appointment as president of that institution is incorrect.

According to *Science* Dr. G. C. Fracker has resigned the chair of philosophy and psychology at Coe College to accept the chair of psychology and education at the State Normal School of Marquette, Mich., where he succeeds Prof. L. F. Anderson, who has gone to the University of Illinois. Dr. F. S. Newell has been appointed to the position in Coe College.

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Peter Sandberg

# INDIVIDUAL DIFFERENCES IN GRAMMAR GRADE CHILDREN

## A Comparative Study of Forty-Four Seventh and Eight Grade Pupils

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### SUMMARY

Twenty-two seventh-grade and 22 eighth-grade pupils were examined with respect to age, height, weight, strength of grip, quickness of perception, ability to add, ability to spell, rapidity of association, auditory memory, and visual memory with the following results:

1. There are the most surprising extremes of ability among children comprising the same school grade in every physical and mental trait examined in this study.

2. In not a single trait are the abilities of the entire group, or of either grade included in the group, distributed as in a normal frequency curve. There is no well defined "center of gravity" in any case.

3. The peculiar form of the surfaces of frequency of the several tests suggests the operation of some eliminating agency or agencies which make this group of pupils a selected group.

4. Neither grade nor sex seems to be responsible for the division of the group studied into smaller groups of more nearly equal abilities. The operative factors are probably indeterminate for so small a group.

5. In all traits examined, except those of age, height, weight, and strength of grip (in all of which nature's handicap of a year in favor of the eighth grade is still effective), the ranges of ability in the two grades are practically identical. There is no line of demarcation.

6. The principles on which the grading of our schools is carried out seem to be unrelated to all of the traits, physical and mental, here studied.

7. A rigid system of grading and promotion must work injustice to individuals, because the pupils of a given grade are not equally endowed in any one subject, and no one of them has the same rank of ability in all of the different studies of the grade. The least variation of ability found in any pupil was five different ranks in ten different traits. Since, under present conditions, grading is necessary, it should be made to depend on natural, rather than artificial, distinctions.

8. Every teacher should, at intervals, test all the pupils in his grade in as great a variety of traits, mental and physical, as possible, for the purpose of obtaining intimate knowledge of and correct insight into the individual qualities and weaknesses of his pupils. Such a means of comparison often explains difficulties and removes obstacles which must otherwise remain mysteries.

9. Emphasis on individual differences must not be interpreted as meaning that there are no qualities in common. So far as human relationships and social demands go, the most unlike people exhibit more similar than dissimilar traits and abilities. Recognition of individual differences in education should entail not so much the presentation of different subject-matter to different pupils as the affording of opportunity for individual reactions on the same subject-matter.

This study was originally undertaken as part of a course in experimental pedagogy in the Colorado State Normal School. It is presented here in somewhat detailed form for the twofold purpose (1) of suggesting a line of investigation which may be undertaken profitably by normal schools without extensive apparatus, and (2) of serving as a type study for the collecting and working up of the data of such investigations. Incidentally, it calls attention anew to the great variation in all forms of ability that exists in any group of children ordinarily treated alike.

The subjects of the investigation were 22 seventh-grade and 22 eighth-grade pupils (13 members of each class being girls);

who were occupying the same schoolroom under the instruction of the same teacher. The classes seemed as homogeneous as any school would furnish, and were in every way typical of their respective grades. The tests and examinations were all conducted by the teacher in charge of the grades and were regarded by the pupils as regular school exercises. With the exception of the physical examinations for height, weight and strength of grip, which were conducted individually, the tests were given as class exercises to the entire group at the same hour on successive days.

As representative of both mental and physical nature, of native and developed capacities, the children were examined and compared as to the following: (1) age, (2) height without shoes, (3) weight in indoor clothes, (4) strength of grip, measured by a Smedley dynamometer (12, 2d Report, p. 21) (5) quickness of perception, (6) ability to add, (7) ability to spell, (8) rapidity of association, (9) auditory memory, (10) visual memory. There are many other simple tests which would have served our purpose just as well, but these were chosen somewhat arbitrarily from the available list.

*Method and Material of the Tests.* Age, height, and weight require no explanation. In Test 4 the average was taken of four grips with the right hand (the left hand in the case of left-handed pupils) on a hand-dynamometer, after the child had familiarized himself with the instrument (12). In Test 5 quickness of perception was measured by the number of A's crossed out of a page of continuous lines of capitals in 75 seconds (16, p. 4). For Test 6 the pupils were furnished with papers containing 20 problems in addition, each problem consisting of 5 numbers of two digits each; the number of correct sums obtained in two minutes determined the standing (15, p. 98). The spelling test included 50 words pronounced by the teacher and written by the pupils. The list of words used by Thorndike (15, p. 99) was adopted. Rapidity of association was tested by the much-used "association of opposites" exercise; a list of 48 adjectives and nouns, adapted from Thorndike (15, p. 99), was given the children, and they were required to write in one minute as many of the opposites of these words as possible. The memory tests consisted in the repro-

duction of the digits of a series of 10 numbers; the numbers ranged from 5 to 8 digits each; each series consisted of two numbers of 4 digits, two of 5, two of 6, two of 7, and two of 8. For auditory memory the digits were pronounced distinctly, in time with a metronome beating 75 times per minute; the pupils wrote the number from memory 5 sec. after the naming of the last digit; for visual memory the number was printed in large characters, and so exposed as to give  $\frac{4}{5}$  sec. per digit. An interval of 5 sec. preceded the writing of the number. Each omission, insertion, substitution, or alteration of a digit was accounted one error (4 and 12). The per cent of error was estimated on the basis of 60 digits in the series of numbers.

*The immediate results* from even a superficial examination of the data revealed by these tests were startling, in spite of the suggestive discoveries of earlier investigators. The oldest child in the group was 6 years,  $7\frac{1}{2}$  months older than the youngest, or more than one-half older; the tallest child was  $13\frac{1}{4}$  in. higher than the shortest; the heaviest weighed 83 lbs. more than the lightest or almost  $2\frac{1}{2}$  times as much; the strongest average grip was  $2\frac{1}{4}$  times the weakest; the best speller was 74 per cent superior to the poorest; and so on through all the tests. And a further interesting point is that all these extremes except age lie in the same school grade, not as would be expected, the lower in the seventh, and the higher in the eighth grade. The minimal and maximal record in each test is given in the following table:

TABLE NO. I  
*Extremes of Ability in each Test*

TEST	MINIMAL ABILITY	MAXIMAL ABILITY	AVERAGE ABILITY
Age .....	11 yrs. 8.5 mos	18 yrs. 4 mos.	14 yrs. 3.5 mos.
Height .....	4 ft. 6 in.	5 ft. 7.5 in.	5 ft.
Weight .....	71 lbs.	154 lbs.	101 lbs.
Strength of Grip..	20 kg.	45.5 kg.	29.9 kg.
Cancellation .....	39 A's	95 A's	60.25 A's
Addition .....	0 problems	9 problems	3.9 problems
Spelling .....	20 per cent	94 per cent	58 per cent
Association .....	0 associations	21 associations	11.5 associations
Auditory Memory	38.3 per cent	90 per cent	64 per cent
Visual Memory..	46.6 per cent	98.3 per cent	78.5 per cent



*The Distribution of Abilities.* But it is important not only to know the extremes of a given trait in a group of pupils, but also to discover how the pupils are distributed between the limits. The number of divisions which shall be made between the extreme records in any given test must be determined by the needs of the occasion and the nature of the data. In the present case it seemed desirable, for purposes of comparison, to have the same number of grades of ability in each of the ten traits examined, and the data of the several tests lent themselves best to a twelvefold division. Consequently, the interval between the best and the poorest record in each test was divided as nearly as possible into twelve equal parts<sup>1</sup> which served as the bases of distribution of the individual abilities between the two extremes. In order to avoid a misunderstanding of terms, throughout the remainder of this paper these divisions of ability will be spoken of as "ranks" and will be designated by the Roman numerals, I being the lowest rank and XII the highest. In the tables and figures the following abbreviations will be used to represent the respective tests: *Ag*-age, *Ht*-height, *Wt*-weight, *Gr*-strength of grip, *Ca*-cancellation of A's, *Ad*-addition, *Sp*-spelling, *As*-association of opposites, *AM*-auditory memory, *VM*-visual memory.

The records for each test are now distributed among the twelve ranks of ability. In this first classification we pay no attention to the school grade of the pupil (*i. e.*, whether he is in the seventh or eighth grade), since we wish to study the group as a whole. But, since we shall have occasion to separate the two grades later for purposes of comparison, and since the second classification will show everything in the first, we proceed in Table II to give the results of the distribution by grades.

<sup>1</sup> The addition test, however, was a necessary exception. Since 9 problems was the best record and 0 problems the poorest, only ten grades of ability were possible. It seems best, in spite of this condition, to retain the twelve divisions here also, and speak of the eleventh and twelfth as unoccupied.

TABLE NO. 2

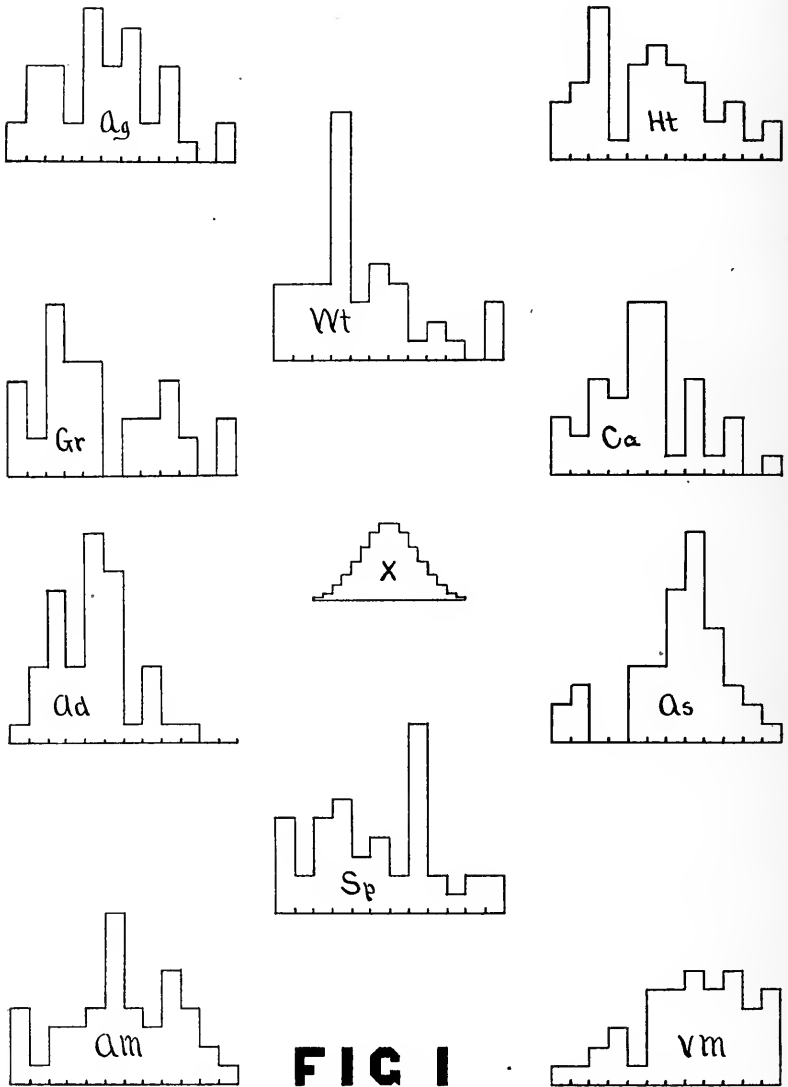
*Number of Pupils in Each Grade Who Fell in Each Rank in the Several Tests.*

RANKS	GRADE	TESTS									
		Ag	Ht	Wt	Gr	Ca	Ad	Sp	As	AM	VM
I.	7	2	2	3	3	2	0	1	1	3	0
	8	0	1	1	2	1	1	4	1	1	1
II.	7	5	4	4	1	1	2	1	2	1	1
	8	0	0	0	1	1	2	1	1	0	1
III.	7	3	8	3	4	2	4	2	0	2	2
	8	2	0	1	5	3	4	3	0	1	0
IV.	7	2	0	8	5	3	3	4	0	1	0
	8	0	1	5	1	1	1	2	0	2	3
V.	7	4	1	1	3	4	6	2	2	3	1
	8	4	4	2	3	5	5	1	2	1	0
VI.	7	3	4	2	0	4	3	2	2	3	3
	8	2	2	3	0	5	6	2	2	6	2
VII.	7	2	1	1	2	0	0	1	3	2	3
	8	5	4	3	1	1	1	1	5	2	2
VIII.	7	0	1	0	0	3	2	6	6	2	1
	8	2	3	1	3	2	2	4	5	1	5
IX.	7	1	0	0	3	1	1	1	4	4	2
	8	4	2	2	2	0	0	1	2	2	3
X.	7	0	1	0	1	2	1	1	1	0	5
	8	1	2	1	1	1	0	0	2	4	1
XI.	7	0	0	0	0	0	0	0	1	1	2
	8	0	1	0	0	0	0	2	1	1	2
XII.	7	0	0	0	0	0	0	1	0	0	2
	8	2	2	3	3	1	0	1	1	1	3

If we combine the figures of the two school grades in Table II and reduce them to surfaces of frequency we get the graphic representations of the distribution of abilities throughout the various ranks shown in Fig. I. It will be noted that the base-lines are all equal and that each is divided into twelve equal parts representing the twelve ranks of ability in the several tests; the lowest rank is at the left, and the highest at the right end. For convenience in comparison a small "normal frequency curve" is given in the figure (X).

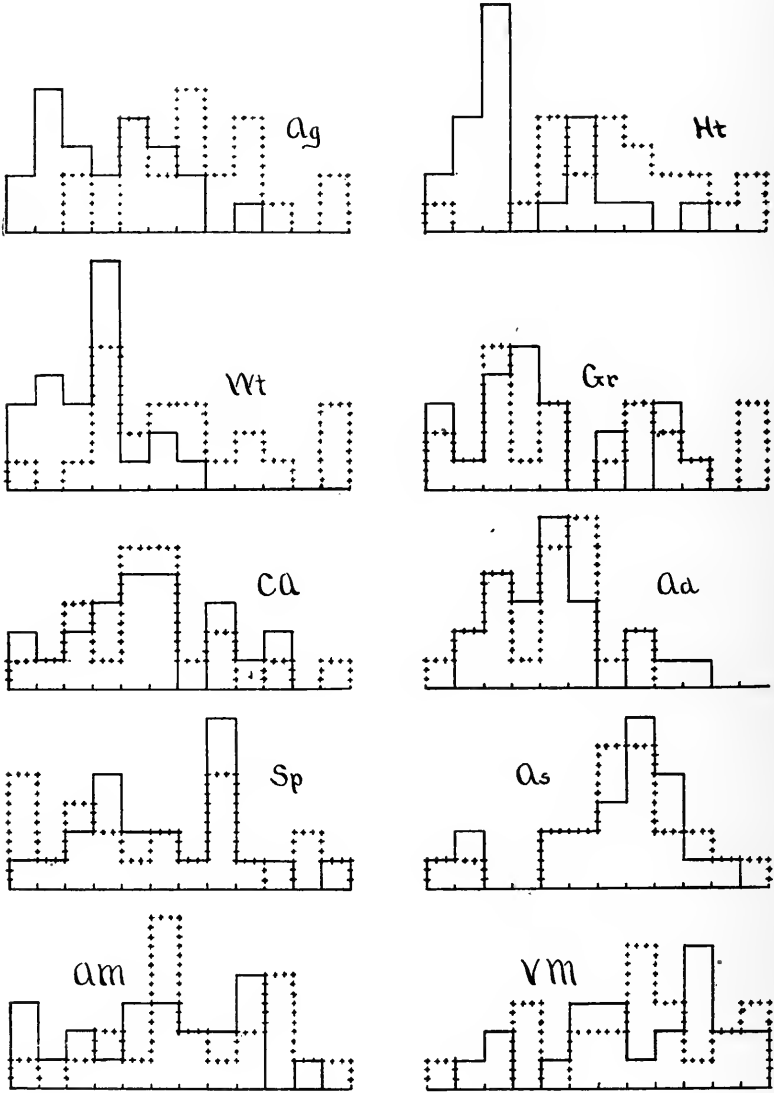
The most casual inspection of the diagrams of Fig. I reveals a remarkable lack of resemblance between the different surfaces and between each of them and the normal surface. There is hardly a single well marked "center of gravity," such as we should expect in the abilities of a group not specially selected. There is a decided tendency for the abilities to cluster in the extreme ranks rather than in a median position, as in a normal surface. This "end-heaviness" indicates that some selective agency has been at work and has eliminated the portion of the group which would have made the surface symmetrical (16). Surface *VM*, for example, suggests that the pupils belonging in the lower ranks of visual memory have been eliminated by failure in school requirements and held in lower grades; this group is therefore a selected one in regard to visual memory. Other peculiarities of this particular surface cannot be thus explained, however. And why has not a similar selective agency affected the Surface *AM*? I think the answer is that auditory memory has not the same intimate relationship to educational advancement as has visual memory. My earlier experiments on memory (4) would justify this conclusion. Just what influences have operated selectively in the several tests the limits of this paper will not permit us to inquire, if, indeed, the data at hand would enable us to decide.

Again, the broken and deeply incised outlines of most of the surfaces strongly suggest that this group of children is not homogeneous, so far as these tests are concerned. Some of the surfaces suggest two, and some three distinct groups of children. Surface *Gr.*, for example, indicates that in strength of grip these 44 pupils fall into three distinct classes; the largest occupies the



five lowest ranks, a somewhat smaller one ranks 7-10, while three individuals belong together in Rank 12. Sex suggests a line of cleavage, but while most of the girls are in the lowest group there are a half-dozen boys there also. Other factors than sex must, therefore, be invoked in explanation.

One of the most obvious explanations to suggest itself is that, where a division occurs in the surface, the lower ranks are occupied by seventh-grade, the higher by eighth-grade pupils. In order to discover to what extent this is true, the data of table II, have been again reduced to surfaces of frequency with the two grades separate. In Fig. II, the surfaces of the two grades are constructed on the same base lines to make comparison easier. The plain lines represent the seventh, the other lines the eighth grade. From a single glance at these diagrams it is obvious that our expectation is not justified. In only the first four surfaces, those pertaining to age and physical characteristics due to age, do the eighth grade children occupy the highest ranks exclusively; and in all of these save the first they share the lowest ranks with the seventh grade children. And while, in the mental tests, there are 13 eighth grade children occupying the two highest ranks as opposed to 9 seventh grade children, the tables show that 21 eighth-grade and 70 seventh grade pupils occupy positions above the averages for the combined grades. Manifestly, an extra year of school life has failed to produce any discernible improvement in the traits tested. Indeed, in two of the abilities concerning which the public is most insistent as to the school's responsibility, viz. addition and spelling, the extra year in school seems to have produced a positive deterioration: in addition the lowest rank is monopolized by a single eighth grade representative while the two highest ranks are preëmpted by two members of the seventh grade. In spelling the lowest rank is occupied by *four* eighth and *one* seventh grade pupils, while the highest rank contains one from each grade. Since this eighth-grade was still reciting in arithmetic and spelling, we cannot justify their deficiency even on the principle of the boy who, when chided for using an adjective for an adverb, replied triumphantly that he had "passed grammar."



**FIG II**

The division of the surfaces of Figs. I and II into distinct groups must be explained, then, on some other basis than that of school grades. Referring again to surface *Gr*, it is seen that, while the highest separate part of the area contains only eighth grade pupils, the other two distinct groups are fairly evenly divided between the two grades. And, in the surfaces representing the mental traits, this distribution of the two grades is still more nearly equal. Considering the facts that there were among these children a few who were young and precocious, several who were old and well grown, but idle, a small group who were underfed and overworked at home, a large proportion of foreign parentage, and a considerable number who had entered the classes from other schools, the group of children contributing to this study was not so homogeneous as at first thought it appeared. There are probably a number of factors involved which would make the explanation of the irregularities of the diagrams next to impossible for so small a number of children.

The most important conclusion reached in the comparison of the distribution of abilities in the two grades is, then, that there is no line of demarcation between them; in regard to every trait examined the grades overlap and in regard to most traits they are co-extensive in their range. Hence, to assume that in two school grades we have two distinct species, that certain abilities are lacking in one and present in the other, that all the members of one class are of approximately equal ability in a certain field and that they are all inferior in that ability to all the members of the other, is, at best, a very hazardous guess. Indeed, by actual test, the poorest eighth-grade records in addition and spelling were surpassed by a third-grade child, selected at random. Teachers cannot afford to forget that our school grades do not represent distinct gradations of ability in the pupils, but are simply convenient devices of administration to facilitate the handling of children in the mass. The grades are determined by reference to more or less artificial standards, and too often do not represent the real intelligence, industry, endurance, adaptability, and other traits important for education, of the pupils. It seems as if ability in perception, association and memory, when

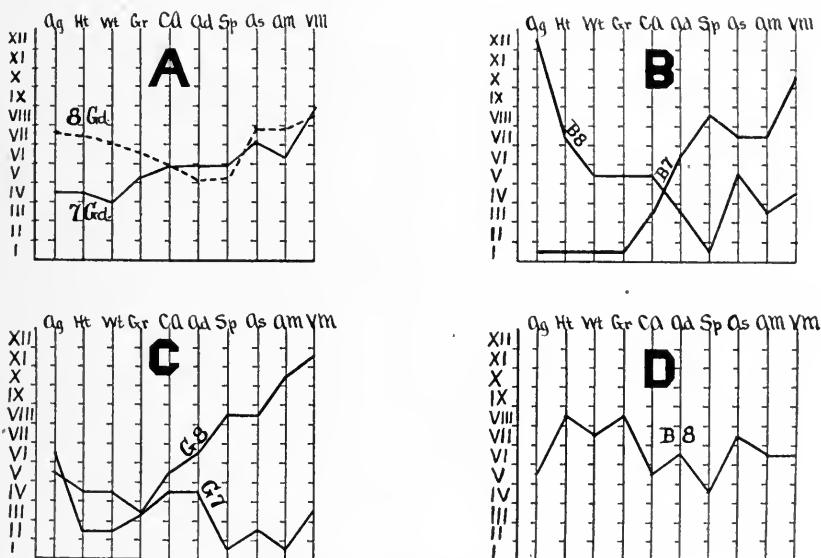
these functions are tested on familiar material, should be pretty closely related to educability, and should be affected by school progress to an extent distinguishable in successive grades, if the grades really grade. The standards of grading in present use are apparently as unrelated to the traits examined in this study, as are the same standards to work in physical training. It is rare, indeed, that classes in physical training are determined on any other basis than scholastic ability. Pupils who recite together in arithmetic also work together in the gymnasium. In physical training, if anywhere, it would seem an easy matter to grade and classify children on the basis of the traits to be developed by the training, *i. e.*, on the basis of physical condition and physical needs.

But, in one sense, the very principle of rigid grading is a psychological absurdity. The demand that all members of a class shall proceed at the same pace presupposes an equality of abilities which does not exist; the requirement that all shall meet the same standards of thoroughness and finish rests on the same fallacy; the practice of having those that are grouped together in one subject recite together in all subjects rests on the assumption that a pupil who maintains a given standing in one subject is able to maintain approximately the same standing in all subjects—an assumption which is by no means justified by the facts. Even in the light of conventional standards no mind is symmetrical, and it is the rare exception to find a student who occupies a corresponding rank in all his studies. In the present investigation, without exception, the abilities of each individual student in the different tests were found to be distributed through a considerable number of ranks. The student who showed least variation occupied every rank from IV to VIII inclusive. The others covered a wider range than this. In five instances a student found in the first rank in one test was found in the twelfth rank in another, with his other records scattered between the two extremes. So far as these tests are concerned there is little evidence of correlation of abilities.

In Fig. III are given graphic representations of the variations in the records of five pupils and also the comparative variations in



the average records of the two grades. In these diagrams the several tests are represented by the vertical lines (as shown at the top of the lines). Each line is divided into twelve equal parts to represent the twelve ranks of ability (as shown at the left). Diagram *A* shows that the eighth grade occupies a higher rank than the seventh grade in only the four physical tests and in auditory memory. In addition and spelling the seventh grade has a slightly better average, but still falls within the same rank



**FIG III**

as the eighth grade. In association the same is true of the eighth grade. In diagram *D* is shown the curve of the boy mentioned above whose various abilities showed the least variation. He was a vigorous well-fed country boy (it will be noticed that his height, weight, and grip rank higher than his age) whose mental abilities had kept pace with his bodily development, but who was in no sense precocious.

In Fig. III, *B*, are given the records of two boys, and in *C* the records of two girls. Curve *B8* is that of one of the oldest eighth-

grade boys, who had been retarded in his physical growth and whose physical retardation had produced a somewhat greater mental stagnation. Curve *B7* represents the smallest and youngest boy in the seventh grade; his precocity is shown by the fact that in each mental test he ranks above the expectation of his physical endowment. Curve *G7* is that of a seventh-grade girl whose physical retardation is accompanied by a corresponding inferiority in most of the mental traits tested. Curve *G8* is that of a healthy country girl in the eighth grade, who was just beginning her pubertal bodily growth, and whose standing in all her classes was high. Curves were constructed for all of the 44 children, but these are fairly typical of the whole. These curves have only a relative value under the conditions of this particular study. They would have a different form if a uniform system of percentages were substituted for the arbitrary "ranks" here used. But there can be no doubt that, to a teacher of these children, such a set of curves would afford valuable suggestions as to modifications of subject-matter and method, or at least as to traits to be watched and experiments to be tried.

President Hall's classic study long ago showed the prime necessity of exploring the contents of children's minds on entering schools in order to secure a sound apperceptive basis for instruction. Have not subsequent investigations sufficiently demonstrated the equal necessity of frequent tests of a wide range physical and mental traits whose results may serve as suggestion for grading, for the development of special interests, for the removal of special weaknesses, and for the adaptation of educational processes generally to the special needs of individual pupils? The study of individual differences has only begun. The possibilities of this field for practical education are only dimly realized. Education is an individual as well as a social process, and its future progress must depend at least as much on the results of investigations of individual differences as upon the facts of common traits and social instincts which have been so strongly emphasized in recent years.

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## THE POINT OF VIEW OF GENETIC PSYCHOLOGY

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The word genetic has been used in connection with psychology for a number of years but its exact significance has not been well defined. The word genesis means, "an account or explanation of the source or origin of anything," and the word genetic, "of, pertaining to, dealing with, or based on genesis." This is the meaning to be associated with the word genetic, when it is applied to psychology.

The old time introspective psychologist did not produce a genetic psychology so long as he simply looked into his own consciousness and reported what he found, with classification and generalization as to the nature of mental states and their relation to each other. The experimental psychologist who observes mental states under definite conditions, and finds, so far as possible, objective indications or measures of those states does not produce genetic psychology. The application of statistics to introspective and experimental facts changes the nature of the psychology only in the way of making it more universal and exact. The physiological psychologist who attempts to determine the character of the physical structure and processes concerned in mental operations, produces a non-genetic psychology.

As soon, however, as the introspective psychologist begins to inquire how his present mental states originated and to trace them back to their beginnings, his psychology becomes genetic. When the experimental psychologist begins to investigate the processes of development by which, under given conditions, present degrees of mental activity have been reached, his psychology also becomes genetic. The physiological psychologist in like manner takes

the genetic point of view when he begins to inquire how the various sense and nerve structures came to have their present form and their present relation to each other.

The comparative psychologist has not the genetic point of view so long as he simply compares different species of animals with each other and with human beings of different races in respect to the nature and degree of their intelligence. Nor does the social psychologist belong to the genetic type, so long as he considers social phenomena as they are now manifested, without reference to their beginnings. Psychology of every type becomes genetic in proportion to the degree to which the search for origins is made prominent and carried back farther and farther toward ultimate beginnings. The old introspective psychology, which recognized perceptions as having their origin in repeated sense experiences, and concepts as resulting from many percepts, could scarcely be called genetic, because the study of the process of change was not emphasized and the resulting higher mental activities were considered as of much greater importance than the beginnings of mental life, and the stages of development by which these activities were reached.

The recent careful and extended studies of learning processes are, to a limited extent, genetic in character, for the *changes* that take place with practice under definite conditions are made prominent, rather than the *results* of the learning processes. Yet the search for the beginnings of the process is not carried back very far, since it usually extends only to the conditions found at the beginning of the experiment. In some of the biographical and individual studies, the development is traced very much farther back in the life of the individual, and the explanation of present conditions is found in early predispositions or in environing influences and special experiences.

In child psychology, or as it is more commonly called, child study, the search for beginnings is carried back still farther to the reflex and instinctive tendencies that are the race inheritance of all human beings, and the attempt is made to trace the development of these tendencies from the earliest years to maturity under the various conditions to which children are subjected.

When the attempt is made to go still farther back in the search for origins and find how the various characteristics of human beings arose, by studying similar characteristics in creatures of a lower type, we have a psychology that is genetic, in the special sense now beginning to be recognized as indicated by the name.

There is good reason to believe that the laws governing the changes from a lower to a higher type of mental activity are to a considerable extent similar, whether the process is one of learning by adults, of development in children or of evolution of racial characteristics. Hence the study of any form of developmental change throws light on all other forms of genesis. It appears, therefore, that every variety of psychology that concerns itself especially with changes from a lower to a higher type of activity is genetic in character, but that the special body of knowledge designated by the term genetic psychology is concerned particularly with the more ultimate and evolutionary study of the beginnings of mind in the lower organisms, and in tracing the development of consciousness from lower to higher forms in the race.

There is really, however, not much more occasion for using the term 'genetic' psychology, than there is for using the term 'genetic' botany, or 'genetic' zoölogy. We do in those sciences sometimes use the term 'evolutionary' botany or zoology, with practically the same significance as we use the term 'genetic' psychology. In botany and zoölogy, however, the term is used not so much to indicate a separate body of knowledge, as to indicate a point of view and a method of studying the phenomena in question. This is also to some extent true of the term genetic psychology and in this more general sense it will probably continue to be used as long as is necessary. It seems to the writer, however, that all psychology must ere long become genetic in point of view and in ways of interpreting facts. Psychology will then be regarded as the apex of the biological sciences and, as in other cases, the biological point of view will naturally be assumed. If this should be the case, there will be no occasion for using the term genetic psychology in a general sense, but only in the special sense to indicate the body of knowledge concerned with the evolution of mind in the race.

It is not, however, simply from the study of biology, that we are led to believe that all psychology must become genetic in character. The more we study the nature and functions of consciousness the more are we impressed with the truth that consciousness is most prominent and useful when changes are taking place. It has little or nothing to do with fixed reflexes and well established habits. It becomes prominent in connection with all new activities and gradually disappears from those activities as they become uniform in character. Any given state of consciousness, viewed by the psychologist, can only be the result of a long series of processes in which one phase or kind of activity after another came into consciousness and then dropped out of consciousness. No study of consciousness as such can, therefore, be scientific which does not regard it as a phenomenon of change and which does not seek to find the explanation of present conditions and future changes in the changes that have previously taken place.

From the point of view of practical application also the genetic feature must always be made prominent. The educator and the moralist are concerned ultimately, not with what is, but with what may be, and this can only be determined by considering what has been, and what laws govern all mental changes. The usefulness of every employee and public servant is to be determined, not simply by what he is, but by the consideration of how quickly and easily he may be made to progress toward what is desired. All standards or norms determined by experimental and statistical researches are of practical value only in so far as the norms have been determined for a group of people of the same general type, with equal opportunity for acquiring the characteristics that have been measured.

It appears from the preceding discussion that genetic psychology, the babe of the psychological family (for which the writer is now acting as god father), is likely to inherit all the accumulations of its parents and brethren and completely dominate, as babes sometimes do, the whole household.

Already the more distant relatives, such as ethics, pedagogy and logic, and even the hoary headed old grandfather philosophy, are beginning to feel the influence of this youngster, and ideas and

ideals of the absolute and unchangeable are giving place to ideas and ideals of the constantly changing, and the ever progressing genesis of the new and better.

The genetic idea will not be understood unless we realize very fully that the changes in the process of genesis are not merely the result of combining elements that remain the same. On the contrary the progress of genesis in organisms and in mind is one in which new characteristics are constantly appearing, so that both whole and parts that are called by the same name are really different in each stage of development. No mental state is the sum of the experiences giving rise to it, just as no vegetable is the sum of the chemical elements of which it is composed.

In this journal it may be worth while to point out more definitely the relation of genetic psychology to educational problems. The older psychologists in considering educational problems, if they did not take the extreme logical view that children should be taught in accordance with the modes of thinking and working suited to the highly developed logical procedure of the specialist, assumed at least that the child's mode of thinking and learning was like their own. This assumption genetic psychology shows to be far from the truth. All research concerning learning processes shows that, even in the case of adults, the beginner in any line does not continue to work in the same way, but that his mode of performing the task is constantly changing, until he has completely learned it. The process of learning is to a considerable extent a process of development and it is utterly impossible to use the methods of the expert in the earlier stage of learning. This has been clearly shown in penmanship, in typewriting and in telegraphy; and tests of arithmetical prodigies and their modes of working as compared with those of ordinary individuals indicate the same truth. When we come to compare the modes of thinking and solving problems used by an adult with those of a child who is trying to deal with the same question, the differences are still more marked. Not only does the adult know more of the particular problem but he has acquired sufficient experience and knowledge to enable him to use more economical methods of procedure than are possible for the child. This fact



that the developing mind cannot function successfully in the same way as do the minds of experts is one reason why the child in the period from two to three years makes, without any specific teaching whatever, more rapid progress in the acquisition of language than is ever made by college students who are taught according to the most approved theories of the older psychology.

The child differs from the adult not only in experience but also because he is in many respects different in his nature. In his early years many of his activities and mental states are more similar to those of higher animals than they are to those of adult human beings. A study of how a dog or cat or bird learns may, therefore, be more helpful in showing how a young child learns and should be taught, than the most careful study of the mental processes of adult human beings.

According to the genetic point of view the mind of the child and every idea in it goes through a process of development, and any attempt to quickly mold the mind or even a single idea of a child into the mature form is sure to fail. The teacher can only do what the gardener does, make the external conditions favorable, supply the proper material for development, and give the necessary stimuli to activity, which in the case of plants are chiefly thermal and in the case of human beings, social. Methods of teaching evolved in the minds of the old time psychologists are, therefore, usually worse than no method at all, since they distort and retard rather than hasten a more perfect development that would otherwise take place in good time.

Genetic psychology demands a complete change in educational theory, not only in ideals as to what a child should study at different stages of development, but also as to the methods by which both children and adults are taught. It demands that, instead of attempting to teach at once methods of working that are suited to the expert, a study of natural methods of learning shall be made and experiments carried on to determine what methods will be most effective in teaching the learner to pass from the crude efforts of the beginner to the accurate performance of the expert. It will be necessary to make a study of learning processes not only

in adults but in children at different stages of development, and also of animals of different grades of intelligence.

Genetic psychology must, inevitably therefore, not only change the point of view of the educator, but greatly increase and complicate the problems which he must meet in arranging courses of study and methods of teaching children of different ages. This change in point of view on the part of educators is now rapidly taking place, and would have proceeded much faster had it not been for the influence of non-genetic psychology, upon which educators tried to found the science and art of education, in spite of the fact that they were continually finding the results unsatisfactory.

# SOME MEASUREMENTS OF MENTAL FATIGUE IN ADOLESCENT PUPILS IN EVENING SCHOOLS

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*(Continued from the January number.)*

## PART II

I can, however, at this point, hear experienced teachers say, "Yes, of course—a two-hour session—all mathematics—we do not wonder at it." So I turned my attention next to a class which attended for one hour per evening only.

### (II.) *With a Class of Telegraph Messengers*

This was a quite exceptionally homogeneous class of growing lads employed as telegraph messengers, who were preparing in their evening class for the sorter's examination held by the postal authorities. This, too, may be looked upon as a class in which there is a form of indirect compulsory attendance at evening school. All the lads do not leave off work early enough to commence attendance at the beginning of the session, namely, 7:30 p.m.; in fact, they have a special hour of attendance of their own, namely, from 9 p.m. to 10 p.m.

The general method adopted was as before. The class was divided into two equal groups and then, on subsequent evenings, one group worked an exercise at 9:03 p.m. and the other group the same exercise at 9:33 p.m. The difference in the work will afford a measure of the difference in mental power as the session wears on, provided, of course, that all the students give their fullest attention to the work. With these students, unlike the previous case, it was felt that there was a kind of competition between Groups A and B, but the purpose of the experiment was not, of course, made known to them.

The exercise on which the division was based was one in "substance" memory. At 9:05 p.m. on November 17, 1908, the students were asked

to memorise visually as much as they could of a passage from a book previously unseen. They were told that they would be required to write out afterwards as much as they could remember, and careful explanation was given to the effect that the *words* of the book were not required, though there was no objection to their use. The students were also told that it was permissible to insert anything at the conclusion of their exercise which they found, on reading through, they had omitted.

Ten minutes were allowed for memorising the passage which follows, and twenty minutes for writing out afterwards what was remembered.

#### PRELIMINARY EXERCISE

While there are some districts, chiefly in the west and north of the country, in which mountains and hills may be said to prevail, the country may be described, in general terms, as level and fertile. Almost everywhere, the eye rests upon the evidences of long continued cultivation, on rich cornfields and meadows, surrounded by well-trimmed hedges and rows of trees. The elm-surrounded Gothic parish church, the clean village cottages with their honey-suckled porches, and the well-wooded parks, with the residences of the noblemen and gentry, are other notable features in the landscape.

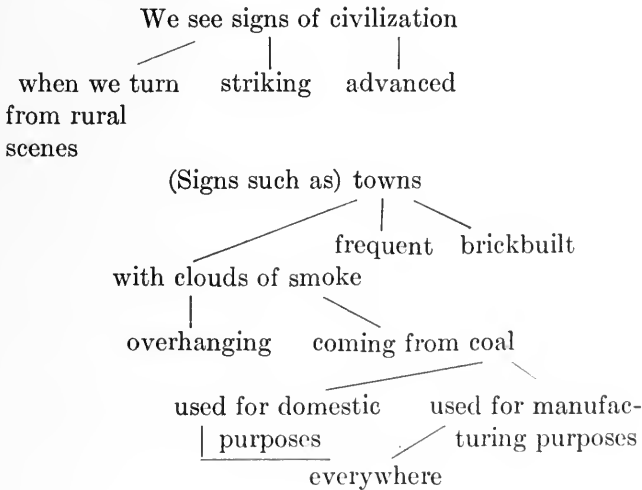
Turning from rural scenes, we see striking evidences of an advanced civilization in the frequent brick-built towns, often overhung by clouds of smoke, resulting from the coal, everywhere used both for domestic and manufacturing purposes. The peculiar features of some of these cities, such as Liverpool, Hull and Bristol, vast ports for merchant shipping, Manchester, Birmingham, Leeds and Sheffield, seats of extensive manufactures, and London, the greatest port and manufacturing city of them all, will be alluded to later on.

To the method of marking, I invite the Society's attention, as I believe it enables us by "objective" methods to get as exact values for substance memory as we have hitherto done for the rote memory of meaningless things. It is possible for one who has had much practice with school children of various ages to make *a priori* an approximate division into units; but such a division is never more than approximate. The basis of division is found in the papers themselves. If, in any group, any member of the group divides in two what, in our

analysis, is unitary, the analysis is amended and two marks allotted, one to each item. We aim to find out what goes into and out of consciousness together; these syntheses we call units, and these differ, of course, according to the mental level we are experimenting with.

The only difficulty in the matter is the great laboriousness of the undertaking, since the same set of papers must often be marked many times before we find that the above basis of marking has been strictly adhered to. We sail gaily along for a while, and presently find someone who has divided an idea which to us seemed unitary. He has remembered one element and forgotten the other; so this at once alters our analysis, and sends us back through all the papers we had already marked. Very roughly we may say that, to pupils of these ages, subjects, predicates, and objects or purposive extensions are remembered together; adjectives and adjectival phrases, adverbs and adverbial phrases, and connecting words form units by themselves.

Let me present a piece of analysis commencing at the beginning of the second paragraph.



This gives a total of 13 units. The *rural scenes* had been described in the preceding paragraph; the adjective “rural” does not in this case carry an additional mark.

One further question arises. How far must variation from the text

proceed before we decide that the idea is not remembered? Well, there is no difficulty where we ourselves would accept the substitution as equivalent. But where we should not, what then? In that case we find out by careful non-suggestive questioning whether the ideas are equivalent in the mind of the pupil. If they are, we allow the mark. "Some" and "many," for example, to large numbers of school children, are interchangeable terms; and, in marking for substance memory, we must accept all terms as equivalent which, in their minds, are thus interchangeable.

The papers were marked by two persons independently, the teacher of the class, and the head of the evening school; doubtful points were decided in subsequent conference with me.

The results of the preliminary exercise follow:

TABLE V

*Showing the Marks Gained in the Preliminary Exercise in Substance Memory*

NAMES INITIALS ONLY	AGE	MARKS	NAME INITIALS ONLY	AGE	MARKS
J. G.....	18	48	L. E.....	16	33
P. H.....	16	45	W. S.....	14	32
S. B.....	15	44	A. S.....	15	30
T. G.....	15	41	W. W.....	14	29
J. D.....	14	41	C. S.....	14	27
H. T.....	18	41	S. C.....	14	21
H. P.....	19	41	C. W.....	15	19
H. T.....	14	40	J. C.....	17	15

The class was then divided into two equal groups as follows:

TABLE VI

*Showing the Division in Two Equal Groups*

Group A			Group B		
NAME INITIALS ONLY	AGE	MARKS	NAME INITIALS ONLY	AGE	MARKS
P. H.....	16	45	J. G.....	18	48
S. B.....	15	44	J. D.....	14	41
T. G.....	15	41	H. T.....	18	41
H. T.....	14	40	H. P.....	19	41
W. S.....	14	32	L. E.....	16	33
W. W.....	14	29	A. S.....	15	30
S. C.....	14	21	C. S.....	14	27
C. W.....	15	19	J. C.....	17	15
Total.....		271	Total.....		276

The next exercise was taken on December 1, 1908.

Those in the first section commenced to memorise at 9:03 p.m., those in the second section at 9:33 p.m. Ten minutes were allowed for memorising as before, and twenty minutes for writing out what was remembered. Whilst the first section were at work on the exercise, those of the second section who were present (four only) were engaged in transcribing geography notes and entering names from the atlas on blank maps—work by no means fatiguing in itself. The lads had not been told that they were to be required to do any special work, and busy times had set in at the Post Office, so that only twelve of the sixteen were present.

The exercise given was the following: It was, as will be seen, much more difficult than the first.

#### FIRST FATIGUE EXERCISE

The fisheries of England are very important. It is stated that about fifty thousand people are engaged in this industry, and that fish to the value of over four millions sterling is sent to British markets annually, not to name our exports.

The great central fish market of all England, is London; and, not only many English counties, but some continental countries, obtain more or less of their supply from Billingsgate, the chief fish market of the city. The North Atlantic Ocean is richer, both in the quantity and quality of its edible fish, than any other portion of the waters of the globe; and of the whole North Atlantic, the North Sea is one of the richest parts. It abounds in shoals and banks, the resorts of fish, the chief of which will be here mentioned.

The Goodwin Sands, off the coast of Kent, provided a lurking place for fish, of which the hardy boatmen of Deal and Ramsgate are not slow to take advantage. Off the coast of Norfolk are the celebrated Yarmouth Sandbanks. Further to the North is the extensive Dogger Bank, stretching across the North Sea, beginning about twelve miles from Flamborough Head, and extending about two hundred miles toward the coast of Jutland.

The papers were marked as before, and the results follow:

TABLE VII

*Showing Marks of Preliminary Exercise and Marks for First Fatigue Exercise of the Two Equal Groups A and B*

<i>Group A. 9:03 p.m.</i>			<i>Group B. 9:33 p.m.</i>		
NAME INITIALS ONLY	MARKS FOR PRELIMINARY EX.	MARKS FOR FIRST FATIGUE EX.	NAMES INITIALS ONLY	MARKS FOR PRELIMINARY EX.	MARKS FOR FIRST FATIGUE EX.
P. H. ....	45	26	J. G. ....	48	28
S. B. ....	44	25	J. D. ....	41	absent
T. G. ....	41	24	H. T. ....	41	absent
H. T. ....	40	25	H. P. ....	41	18
W. S. ....	32	25	L. E. ....	33	22
W. W. ....	29	25	A. S. ....	30	17
S. C. ....	21	18	C. S. ....	27	absent
C. W. ....	19	14	J. C. ....	15	absent

Every pupil has gone down; a result due to the great difficulty of the exercise. P. H. has gone down 42 per cent., the corresponding lad in Group B, J. G., has also gone down 42 per cent.; whilst H. P., L. E. and A. S. show a marked falling off as compared with the pupils in Group A who were level with them in the preliminary exercise. Omitting the four absentees in Group B and the corresponding pupils in Group A, we find that, whilst Group A, which scored 146 marks in the preliminary, now scores 101, Group B, which scored 152 in the preliminary, now scores 85 only.

The teachers, however, felt that, with half of the second group away, our experiment could not be regarded as conclusive, so we determined to try again. Since J. D., H. T., C. S. and J. C. had missed an exercise, their condition as regards improvement by practice would be different from that of the corresponding pupils in the other group, and so we should get an erroneous result if we included them. But, by transferring T. G. and C. W. to the B Group, and leaving out all the unpracticed pupils, we succeeded in getting two equal groups for our final exercise. The teachers thought we should tell the lads we wanted them to come for an experiment, so we told them that it was for a memory competition—Group A against Group B. We had no absentees next time; the boys seemed as interested as if they had been coming to a football match.

The final exercise was given on Monday, December 7. Group A began at 9:05 p.m. and Group B at 9:35 p. m. Warned by our experience with the second, we made this easier, but still knowing how



rapidly exercise improves memory, we judged that, it would be well to make it harder than the preliminary exercise, if we wished to get a clear difference between Groups A and B. As it was thought that some relevant fatigue might have been produced by the preliminary geography at which Group B worked before taking the exercise, which was itself geographical, this group, on this occasion during the first half-hour, worked a set of easy proportion sums, such as are required for their sorters' examination.

## SECOND FATIGUE EXERCISE

The arable land of Scotland, which covers no more than a third of the whole surface, chiefly lies in broad valleys sloping towards the sea-coast, known as glens and dales. The less steep hilly districts are chiefly sheep-walks and cattle pastures. Timber, which once covered a large portion of the surface, is now chiefly confined to the neighborhood of gentlemen's and noblemen's dwellings, and to plantations which have been raised within the last hundred years to protect arable lands from the cold winds.

To the north of a curved line drawn between Glasgow and Aberdeen, the country is more mountainous than elsewhere, and is therefore called the Highlands. This is a district full of romantic scenery, consisting of rugged, gloomy mountains, lonely lakes, rushing streams, and wild natural woods.

The time for memorising and the method of marking were as before.

The results follow:

TABLE VIII

*Showing the Marks Obtained in the Preliminary Exercise, and the Marks Obtained in the Second Fatigue Exercise of Groups A and B*

Group A.			Group B.		
NAME INITIALS ONLY	9:05 p.m.	9:05 p.m.	NAME INITIALS ONLY	9:5 p.m.	9:35 p.m.
	MARKS FOR PRELIMINARY EX.	MARKS FOR SECOND FATIGUE EX.		MARKS FOR PRELIMINARY EX.	MARKS FOR SECOND FATIGUE EX.
P. H.....	45	40	J. G.....	48	37
S. B.....	44	36	T. G.....	41	23
H. T.....	40	33	H. P.....	41	27
W. S.....	32	40	L. E.....	33	18
W. W.....	29	40	A. S.....	30	28
S. C.....	21	25	C. W.....	19	20
Totals.....	211	214	Totals.....	212	153

I venture to suggest that this is a most striking result. Group B is slightly the stronger group, yet half an hour's difference in the time of the second fatigue exercise produces a difference of 28 per cent. in the results; whilst a still more conclusive inference can be drawn from the fact that, in every instance, the lad in the 9:35 group does much worse work than the corresponding boy in the 9:05 group. And in this case we cannot argue that the falling off is due to one kind of lesson being continued too long, as might, perhaps, have been the case with the artisan class in workshop arithmetic.

We are driven to the conclusion that these pupils are so little fit in the evening for mental work of any difficulty that half an hour in class, after the work of the day, is sufficient to produce fatigue. This class attends a school which has the best ventilation—open fire and open windows,—is a one-floor school, and is situated among fields and open spaces; the hygienic conditions of work are admirable, yet in half an hour mental energy is fast sagging away. Those in this Society who know my work on fatigue in day schools will know how very, very different are the 12 o'clock and 4:30 p.m. results from these. If fatigue exists at all at those hours, it is quite insufficient to mask a steady improvement by practice. Whereas, in the latter part of the evening school session mental energy seems so low that improvement by growth (for these are all young people) and by practice does not appear at all.

### (iii) *With Classes of Mixed Occupations*

I have given the results of work done in two homogeneous classes in two schools, one situated in a manufacturing neighborhood, and one in a suburban-residential neighborhood. I turn now to experiments conducted on the same general plan in a school containing mixed classes, the pupils of which attend for the purpose of preparation for, or becoming more proficient in, the lower grades of clerical work.

#### a. In Numerical Computation (Males and Females)

On November 4, at 8:30 p.m., halfway through the evening school session, the following exercises were given to a mixed class who came

for a two-hour lesson in arithmetic. Half an hour was allowed for the work; the marks for a perfectly correct solution are given in brackets after each sum. For an error in one or two figures only, in any one sum, one mark was subtracted; further inaccuracy involved the loss of all the marks given for that sum. I have worked out a much more satisfactory system of units for sums of this kind, but the marking would have been too laborious, and not known to the teacher, who, of course, preferred to mark in his own way. And, as I intended these exercises only as a less exact test to see whether the results of the rigorous and definite exercises previously described were borne out in the main, I thought that a less degree of statistical regularity would suffice.

## PRELIMINARY EXERCISE

- (1)  $7,268,514,268 \div 6, 7, 8, \text{ and } 9.$  (10)
- (2)  $7,268,514,268 \times 6, 7, 8, \text{ and } 9.$  (10)
- (3)  $\text{£}5 \text{ 4s. } 6\frac{1}{4}\text{d.} \times 365.$  (10)
- (4)  $\text{£}2,318 \text{ 17s. } 9\frac{1}{4}\text{d.} \div 139.$  (10)
- (5)  $\text{£}2,318 \text{ 17s. } 9\frac{1}{4}\text{d.}; \text{ reduce to farthings.}$  (5)
- (6) L. C. M. of 2, 9, 34, 51, 21. (5)
- (7) G. C. M. of 209, 1241, and 7373. (5)
- (8) Simplify  $\frac{1}{4} + \frac{7}{8} + \frac{2}{7} + \frac{1}{3}.$  (5)
- (9)  $\text{£}12,000 \text{ 6s. } 8\frac{3}{4}\text{d.} - \text{£}10,565 \text{ 13s. } 4\text{d.}$  (5)
- (10)  $29,156 \times 396.$  (5)
- (11)  $482,396 \div 760.$  (5)
- (12)  $2,864,597 - 1,995,469.$  (5)
- (13)  $\frac{5}{8} + \frac{2}{3} + \frac{1}{10} + \frac{3}{11}.$  (5)
- (14)  $123,456,789 \div 9.$  Then each successive answer by 8, 7, 6, 5, 4, 3, respectively. (10)
- (15)  $\frac{5}{8} \times \frac{2}{3} \times \frac{5}{6} \times \frac{8}{9} \times \frac{6}{7} \times \frac{5}{8}.$  (5)

The students were then divided into two approximately equal sections and, on November 18, one group worked the following exercise at 8 p.m. and the other at 9 p.m.

## FINAL EXERCISE

- (1)  $62,859,378,453 \div 6, 7, 8 \text{ and } 9.$  (10)
- (2)  $62,859,378,453 \times 6, 7, 8 \text{ and } 9.$  (10)

- (3) £765 13s. 7½d. × 365. (10)  
 (4) £2,814 14s. 5½d.; reduce to farthings. (10)  
 (5) £2,814 14s. 5½d. ÷ 187. (5)  
 (6) L. C. M. of 5, 17, 102, 35, 21. (5)  
 (7) G. C. M. of 366,654,339. (5)  
 (8) Simplify  $\frac{1}{3} - \frac{3}{8} - \frac{5}{12} + \frac{19}{24}$ . (5)  
 (9) £70,253 13s. 5½d. - £12,345 13s. 8¼d. (5)  
 (10) 7,854,523 inches to miles. (10)  
 (11) 3 qrs. 17 lbs. 11 oz. 7 drs. × 35¾. (10)  
 (12) 97,654 × 78,065. (5)  
 (13) 394,959 × 476,787. (5)  
 (14) 7,300,400,029 ÷ 236,421. (5)  
 (15) £341 1s. 8¼d. + £6,132 6s. 5½d. + £2,748 19s. 11¼d. + £1,249 12s. 8½d. (5)

It will probably be sufficient in this case if I give one table showing the results of all the work together.

TABLE IX. (MALES AND FEMALES)

*Showing the Comparative Results of the Work of Groups A and B in Numerical Computation*

GROUP A					GROUP B				
NAME INITIALS ONLY	AGE	OCCUPATION	1ST. EX. 8:30 P.M. 4/11/08	2D EX. 8 P.M. 18/11/08	NAME INITIALS ONLY	AGE	OCCUPATION	1ST. EX. 8:30 P. M. 4/11/08	2D EX. 9 P. M. 18/11/08
W. A.	16	Telegraph messenger ..	73	88	Q. W.	16	†Clerk.....	80	72
S. A.	18	Telegraph messenger ..	43	†19	C. J.	15	Warehouse boy ..	53	36
O. J.	17	Laboratory assistant ..	35	39	P. E.	14	Clerk.....	38	28
*H. E.	15	Typist .....	31	32	*K. E.	14	None.....	33	39
O. W.	14	Clerk .....	28	16	K. Ed.	15	Clerk.....	31	11
G. G.	18	Telegraph messenger ..	26	36	B. A.	14	Clerk.....	29	51
L. J.	15	Clerk .....	21	32	H. F.	14	Clerk.....	23	12
E. W.	16	Telegraph messenger ..	16	11	B. A.	14	None.....	16	17
*M. A.	16	None .....	12	16	M. E.	15	Engineer.....	7	17
			285	289				310	283

\* Females.

† Clerks may be office boys, who frequently describe themselves as clerks.

‡ S. A. arrived late on November 18; he was obviously "rattled" the teacher thought, so that the 19 marks by no means represented his usual work.

All the members of Group A, except two, show improvement on their first exercise; whereas, in Group B, four only show improvement, whilst five show a very marked decline even on their own previous record. This is certainly remarkable in an exercise like this, which is extraordinarily susceptible to improvement by practice. Moreover, comparing Group A with Group B, we find that, whereas the second group started 25 points above Group A, it finished 6 points below, and had not S. A., through his lateness and agitation, belied his usual record, would have finished some 35 points below.

Thus, once again, we see a serious falling off in power as the session proceeds, even in such purely mechanical work as numerical computation.

Is it merely accidental that all the pupils marked as of no occupation show improvement in the second exercise even in the cases in which the second was done at 9 p.m.?

b. In Elementary Shorthand. (Males)

At 8:30 p.m. on November 2, the following exercise was given to a class in elementary shorthand:

PRELIMINARY EXERCISE

Exercise from Pitman's *Teacher*

*Transcribe from Shorthand to Longhand*

- Ex. 2. Consonants.
- Ex. 4. Joined consonants (lines 2, 4, 6).
- Ex. 6. Joined consonants *ch* and *r* strokes (2, 4, 6).
- Ex. 8. Joined consonants. More than two.
- Ex. 10. Words and vowels (lines 2 and 4).

*Transcribe from Longhand to Shorthand*

- Ex. 3. Consonants.
- Ex. 5. Joined consonants (lines 1, 3, 5, 7).
- Ex. 7. Upward and downward *r* (lines 1, 3, 5, 7).
- Ex. 9. Words and vowels.
- Ex. 11. Words using long vowels (2, 5, 9, 10).

A mark was given for each accurate transcription of shorthand into longhand and longhand into shorthand. This basis of marking

is not altogether satisfactory, as experts in shorthand will know, but it is sufficiently close to give results accurate in the aggregate.

On the basis of this work the class was divided into two equal groups, and, on November 16, Group A worked the following exercise from 8 to 8:30 p.m. and Group B from 9 to 9:30 p.m. All the rest of the session, before and after the exercises, was occupied with shorthand, as usual. The second exercise was much more difficult than the first.

#### SECOND EXERCISE

##### Exercises from Pitman's *Teacher*

##### *Transcribe from Shorthand to Longhand*

- Ex. 4. (Lines 3 and 5) joined consonants.
- Ex. 6. (Lines 3 and 5) joined consonants *r* and *ch* combinations.
- Ex. 12. Words and vowels.
- Ex. 14. Words and vowels.
- Ex. 16. Sentences.

##### *Transcribe from Longhand to Shorthand*

- Ex. 5. (Lines 2, 4, 6). Joined consonants.
- Ex. 7. (Lines 1, 3, 5, 7). Upwards and downwards *r*.
- Ex. 9. Words and vowels.
- Ex. 11. Words and vowels.
- Ex. 13. Words and vowels.
- Ex. 15. Words and vowels.

The basis of marking was as before.

The results follow:

TABLE X

*Showing the Work of Groups A and B compared in Elementary Shorthand (Males)*

GROUP A.					GROUP B				
NAME INITIALS ONLY	AGE	OCCUPATION	1ST EX. 8:30 P.M. 2/11/08	2D EX. 8 P.M. 16/11/08	NAME INITIALS ONLY	AGE	OCCUPATION	1ST EX. 8:30 P.M. 2/11/08	2D EX. 9 P.M. 16/11/08
Q. W.	16	Clerk.....	260	282	W. H.	15	Clerk.....	267	168
H. W.	16	Clerk.....	238	168	B. A.	15	Post boy.....	225	133
B. A.	14	Clerk.....	186	130	P. A.	15	Messenger.....	198	122
R. E.	14	Clerk.....	159	148	W. R.	14	Clerk.....	160	144
T. E.	14	Reader.....	150	109	P. M.	15	Publisher's assistant..	14	128
F. J.	14	Clerk.....	142	122	J. H.	14	None.....	136	112
P. F.	14	Clerk.....	135	102	S. W.	15	Messenger.....	135	138
W. J.	15	Messenger.....	128	73	S. F.	15	Reader.....	127	70
C. J.	15	Clerk.....	120	78	L. L.	15	Clerk.....	113	82
H. F.	15	Messenger.....	112	90	H. H.	14	Library boy.....	107	66
S. W.	15	Clerk.....	102	68	C. R.	14	Telegraph messenger..	90	36
			1732	1370				1706	1199

The result is striking. Group B, which started only 26 points below Group A, finishes 171 points below. Group A does not, as in other cases, improve on its previous record; the increase in the difficulty of the exercise was probably the cause of that; but we can compare the decrease in marks shown by the members of Group A with the decreases shown by the corresponding members of Group B; or, a still simpler method, we can compare the actual marks of the members of Group B with the actual marks of the corresponding members of Group A. In 8 cases out of a total of 11, the lad in Group B does inferior work to the boy in Group A with whom, on the occasion of the preliminary exercise, he was found to be approximately equal.

The difference of an hour in the course of the evening appears to produce a very marked difference in the capacity for accurate work, even in work as mechanical as these exercises are said to be.

## c. In Advanced Shorthand. (Males)

This was a small class containing eight pupils only, and an absentee on the occasion of the second exercise reduced the numbers available for comparison to six since the corresponding pupil in the other group had, of course, to be omitted. The preliminary exercise was given on November 2, at 8:30 p.m. The second or test exercise, which was easier, was given on November 16 to Group A at 8 p.m., and to Group B at 9 p.m. Half an hour was allowed for each exercise as before. The basis of marking was as before. The problems and the results follow:

## PRELIMINARY EXERCISE

Pitman's *Manual**Shorthand to Longhand*

Ex. 42. Sentences.

Ex. 48. Sentences.

Ex. 46. Sentences.

## FINAL EXERCISE

Pitman's *Manual**Longhand to Shorthand*

Ex. 47. Sentences.

Ex. 50. Sentences.

Ex. 49. Words.

TABLE XI

*Showing the Work of Groups A and B Comparatively (Males)*

GROUP A					GROUP B				
NAME INITIALS ONLY	AGE	OCCUPATION	1ST EX. 8:30 P.M. 2/11/08	2D EX. 8 P.M. 16/11/08	NAME INITIALS ONLY	AGE	OCCUPATION	1ST EX. 8:30 P.M. 2/11/08	2D EX. 9 P.M. 16/11/08
R. F.	16	Clerk. ....	258	248	W. F.	18	Clerk. ....	297	286
P. W.	17	Clerk. ....	146	191	M. E.	18	Clerk. ....	149	167
W. G.	16	Clerk. ....	67	204	D. A.	17	Clerk. ....	88	184
			471	643				534	637



The absence, above referred to, threw the groups out of balance, and we now have a much stronger group working the exercise at 9 o'clock than at 8 o'clock, but, notwithstanding this fact, the 8 o'clock group does superior work in the final exercise. The difference in the time appears to have caused the members of Group A to catch up 63 points and pass Group B by 6 additional points.

Calculated as percentages of their previous work, the results from these six pupils appear thus on the final exercise.

TABLE XII

*Showing the Comparative Increase in the Marks of Groups A and B from the First to the Final Exercise*

Group A		Group B	
NAME INITIALS ONLY	PERCENTAGE SHOW- ING INCREASE OR DECREASE	NAME INITIALS ONLY	PERCENTAGE SHOW- ING INCREASE OR DECREASE
R. F. ....	96	W. F. ....	97
P. W. ....	130	M. E. ....	112
W. G. ....	300	D. A. ....	210
	<hr/> 176		<hr/> 139

The second exercise, as every shorthand teacher knows, was decidedly easy as compared with the first; yet, even on this second exercise, a difference of an hour earlier or later involves a difference in the percentage of increase on the marks of the preliminary exercise of no less than 37 per cent, and, as might be expected, it is the weaker students who reap most advantage from the earlier hour. W. F. is so much the best that it is hard to place him in these groups at all.

*d.* In Intermediate Shorthand. (Females)

The next class in which the experiments were made was very mixed. It contained one typist, one clerk, two dressmakers (learners), two milliners (learners), one pattern-card maker, one bookfolder, and five pupils who did no work at all. I rather despaired of getting any uniformity of results in a class of this kind, and the evidence shows that my fears were justified; but I thought it well to include such a class, if only for purposes of comparison.

The general method was the same as before—a preliminary exer-



There is obviously no general advantage or disadvantage in the earlier as compared with the later hour so far as this class is concerned. But of *six* pupils in the 9 o'clock section no less than *four* do no work during the day, whilst in the early group only one pupil is without daily work, and she, be it noted, shows an increase of 100 per cent. on her first exercise. The only safe conclusion from the work of this class is that very great care is needed in such experiments as these not to lump together the results of those pupils whose daily work is very different. In other words, classes must be fairly homogeneous before, by class methods of this kind, we can hope to get any definite results at all. That, if we take due precautions, we can obtain, by easy school methods, a series of perfectly valid and uniform results is shown by the whole course of this series of experiments; but I include the last table in the hope that it may check hasty and inconclusive experiments, and also because I hold that in work of this kind every result obtained should be shown, without selection.

#### 6. SUGGESTED CONCLUSIONS

For readers of scientific journals the evidence above adduced will doubtless be sufficient to inspire a strong and definite conclusion. My own would run somewhat thus—*that evening work is comparatively unprofitable, and that a short time in class in the evening is sufficient, PLUS the labors of the day, to induce a very low condition of mental energy.*

Evening schools will, doubtless, always find some place in an educational system, recreatively and otherwise; but to me they seem likely to prove unprofitable, if considered as places of seriously continued education for adolescent students. If the definite education of the elementary school pupil is to continue after fourteen years of age, his hours of day labor must at least be reduced, if evening study is to be educationally profitable. I incline to doubt even then whether his mental energy would be satisfactorily sustained during the evening. It is not brightness, nor cheerfulness, nor an interest in novelties which are required, but patient, and rapid, yet unexcitable mental application, dependent, as it certainly is with pupils of this type, upon a generally fresh and vigorous condition.

The long two-hour lessons have, perhaps, played a part in producing the poor results of the work in the later part of the evening; though we have to remember that the telegraph messengers' class was a one-hour class only. Teachers say that students do not care to come for *one* hour's instruction in *one* subject, and that they will not come *two* consecutive nights for *one* hour each; and, doubtless, the present two-hour lessons have many administrative advantages.

Nothing but definite and protracted experiment could tell us whether the shortening of the *lessons* would make the evening school more profitable; but I incline to the view that serious evening study for adolescents would not be very profitable in any case. This, however, is an opinion merely; the only certainty is the comparatively unprofitable nature of the present work under present conditions, due, apparently, to the rapid falling-off of the mental energy of the students as the evening proceeds.

# NEW INSTRUMENTS FOR TESTING DISCRIMINATION OF BRIGHTNESS AND OF PRESSURE AND SENSITIVITY TO PAIN<sup>1</sup>

DR. GUY MONTROSE WHIPPLE

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For the discrimination of brightness, use has been made of Masson's disc, both by daylight and artificial illumination, of the episkotister, of gray papers, of dyed cloth, and of shadows. All of these devices present technical difficulties, particularly when it is desired so to standardize the material that tests conducted by one experimenter shall be comparable to those conducted by another.

In the search for a method of testing brightness discrimination that should avoid these difficulties and that, at the same time, should demand only simple and relatively inexpensive apparatus, the writer has contrived two new forms of brightness test, the first by reflected, the second by transmitted light.

## I. DISCRIMINATION OF GRAYS BY REFLECTED LIGHT

The apparatus for the discrimination of grays by reflected light (Fig. 1) consists of a set of ten test-cards, each composed of two gray strips, 13 x 40 mm., pasted upon a white card 10 x 10 cm. Each card bears one strip of a standard gray and one strip of a darker, comparison gray. As numbered on the reverse side, Card No. 0 represents no difference, or objective equality: Card No. 1

<sup>1</sup> These three instruments were shown at the meeting of the American Psychological Association at Cambridge in December. More explicit directions for their use are contained in the writer's forthcoming *Manual of Physical and Mental Tests*. The instruments may be purchased of C. H. Stoelting, 121 North Green Street, Chicago.

represents the minimal objective difference, Card No. 9 the maximal objective difference.

The grays used on these cards have been specially prepared under the writer's direction by S. L. Sheldon, photographer, of Ithaca, and have been carefully standardized. Every set of grays is printed from the same negative, on which the original series of brightness-differences was formed by a graded, serial exposure before a sheet of milk glass set in a north window. The tones, sizes, and spatial relations of the strips, cards, and background have been selected to minimize errors that might arise from contrast and adaptation. The size of the strips is slightly smaller than that prescribed by Ament (1),  $18 \times 45$  mm., and slightly larger than that prescribed by Titchener,  $10 \times 40$  mm., for the demonstration of Weber's Law in brightnesses.

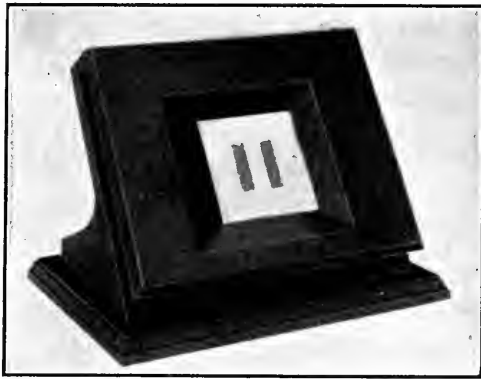


FIG. 1

These test-cards are inserted, one at a time, in the exposure frame, where they lie in a special card-holder of a 'turn-table' pattern, which may be rotated through 180 degrees by means of a knob at the back of the apparatus. They are viewed through an opening ( $8 \times 8$  cm.) in the black cover of the instrument.

In use, the apparatus is placed upon a small table, squarely before a north window where good diffuse daylight may be secured. A large gray cloth is first spread over the table and carried up vertically at the back to form a neutral background upon which the observer's glance may rest when he is not regarding the test-

cards. The experimenter then ascertains by methodical procedure the test-card in which the brightness-difference is correctly judged in 80 per cent. trials, taking care, of course, that the darker gray is shown in half of the trials on the right, in half on the left.

## II. DISCRIMINATION OF BRIGHTNESS BY TRANSMITTED LIGHT

The apparatus for the discrimination of brightness by transmitted light (Fig. 2) consists of a black box fitted with a 32 C. P. frosted tungsten lamp, the rays of which are reflected from two independently adjustable white screens upon two oblong trans-

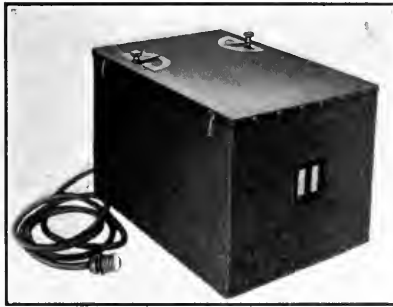


FIG. 2

lucent windows, so placed in the face of the box as to afford the same dimensions and spatial relations as obtain in the gray strips of the instrument first described.

The observer is seated some 50 cm. directly in front of the apparatus, while the experimenter controls the illumination of the windows by suitable adjustment of the levers which move the reflecting screens, and which are provided with scales upon the upper surface of the box. If desired, a red or other colored lamp may be substituted for the frosted lamp, so that discrimination of colors of different brightnesses may be tested.

## III. THE PRESSURE-PAIN BALANCE

The testing of discriminative sensitivity for pressure, sometimes known as the test with 'resting weights', depends for its feasibility very largely upon the type of apparatus employed. In particular, variation in the temperature of the weights, in the area and place stimulated, and in the manner of application of the weights must be excluded. To obviate these sources of error, the principle of the 'pressure-balance' has been adopted by several investigators, *e. g.*, Merkel (6), Jastrow (4), and Bolton and Withey (2).

In measuring sensitivity to pain, also, the principle of the balance has been utilized by Gilbert (3) in the construction of a

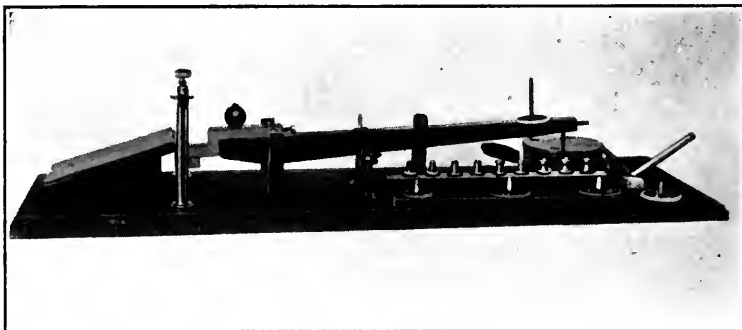


FIG. 3

'balance-algometer.' In this test, the use of the balance makes it possible to control the rate of application of the stimulus, a feature which is virtually lacking in the algometers of Cattell and MacDonald (5), but which is essential to the conduct of the test.

The writer's pressure-pain balance (Fig. 3) is designed to embody in a single instrument all of the features necessary for the control of the application of the stimuli, both in testing discrimination of pressure and in testing sensitivity to pain.

The instrument consists of (1) a hand-rest, (2) a fixed cross-bar carrying an adjustable vertical screw whose hard-rubber terminal constitutes the stationary pressure-tip, (3) a balanced beam,



which carries the movable pressure-tip and upon which the stimulus-weights are placed, (4) a cam and lever for regulating the movement of the beam, (5) a set of weights for standard and increment pressures, (6) a set of large disc weights for pain tests, and (7) a lever-device for lifting the increment-weights from the beam when desired.

In operation, when testing discrimination of pressure, the subject's finger tip is placed directly under, and in contact with, the stationary pressure-tip. A weight, marked B-100 g., is placed upon the pin (marked *B* on the instrument) at the outer end of the beam. This weight is not removed during the experiment, and constitutes the standard stimulus, 100 g. Upon the second pin, (marked *A* on the instrument) is placed any desired increment-weight ( a range of 1 to 69 g. is provided). These increment-weights are added to the standard stimulus when they rest upon the beam at *A*: they are subtracted at will from the total pressure by depressing the increment-weight lever, which lifts them from the beam, and allows only the standard stimulus to be operative. The several pressures are applied to the finger by moving the lever at the extreme right of the instrument up to the left, so as to depress the support beneath the beam. The instrument is noiseless, convenient, easily operated, and simple in construction. With practice the pressures may be applied perfectly evenly and as rapidly as is desirable for optimal discrimination.

When this instrument is used for measuring sensitivity to pain, the cam support is, preferably, permanently depressed, and the larger weights, each of which produces 200 g. pressure upon the finger tip, are applied at the rate of one in two seconds upon the pin *B*. The pressure is, therefore, cumulative and increases at a uniform and predetermined rate. The application of the weights continue until the observer reports the first experience of real pain, as distinct from strong pressure or discomfort.

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## ABSTRACTS AND REVIEWS

FRANCIS GALTON, F.R.S. *Memories of My Life*. (New York: E. P. Dutton & Company. 1909. Pp. 331).

A charming account of a charming personality, a book in which a notable man of science recounts all too briefly the development of the more important phases of his many-sided life. Galton's parentage, childhood and boyhood are sketched in two short chapters: his medical studies and his life at Cambridge occupy two more: his geographical interests—travels in Egypt, the Sudan, Syria, Southwest Africa, etc.—are the subjects of some half-dozen chapters. In other sections attention is paid to the establishment of the Kew Observatory, and to the work of the British Association, here, as elsewhere, with abundant anecdote and reminiscence.

Psychologists and educators will, however, peruse with most immediate interest the last five chapters in which Galton explains how he came to develop anthropometric laboratories, to try composite portraiture, to investigate number-forms, to invent the method of centile-grades, to exploit the possibilities of arithmetic by smell, and in which, generally, he surveys the progress made in the measurement of mental traits, and in our understanding of the principles of heredity. He declares that the leading principles of the modern eugenics movement, with which his name is so closely associated, are essentially the same as those he expressed as long ago as 1865, and in his closing paragraphs he says:

"I take Eugenics very seriously, feeling that its principles ought to become one of the dominant motives in a civilized nation, much as if they were one of its religious tenets." . . . "Natural selection rests upon excessive production and wholesale destruction; Eugenics on bringing no more individuals into the world than can be properly cared for, and those only of the best stock."

The book is well printed, contains eight illustrations, including two recent autograph photographs of Galton. The list of his 182 contributions to science, chronologically arranged, is unfortunately misnumbered so that all numbers above 75 must be reduced by one to correspond with the references in the text.

G. M. W.

DR. MADISON BENTLEY. *Mental Inheritance*. Popular Science Monthly, 75: November, 1909, 458-468.

J. F. BOBBITT. *Practical Eugenics*. Pedagogical Seminary, 16: September, 1909, 385-394.

Bentley's paper is an address delivered before the Cornell University chapter of the Sigma Xi, in which the problems of heredity are explained, and the methods by which psychology, in particular, can attack these problems are discussed. The author shows that we have no evidence that mental capacity has kept pace with social accumulation: rather, "as regards mental endowment, we begin very much as our distant forbears began." The present eugenics movement looks toward an improvement of mental capacity, and therefore assumes that mental capacity is heritable. Of the two main lines of work upon heredity in biology—biometry and the qualitative analysis of unit characters (as in the work of the Mendelians)—psychology has thus far made use primarily of the first alone, e. g., in the biometrical methods of Francis Galton. These methods have proved, to be sure, that mental ability depends in large measure upon direct inheritance, but we are forced to be more specific; we wish to know more exactly the degree of inheritance of particular mental abilities just as the biologist seeks to measure the degree of inheritance of particular bodily organs. So far, investigators of mental inheritance have, in their search for these specific mental characters, fallen back upon such gross terms of popular psychology as "sound judgment," "temper," "conscientiousness," etc., e. g., in the work of Pearson and of Heymans and Wiersma. "But," asks Bentley, "cannot this method be improved?" The work of Mendel surely suggests to psychologists that mental inheritance must now be studied "not in the gross, but in terms of definite and measurable mental structures and functions." Psychology must develop a "doctrine of mental characters" in place of the "popular conception of vague and indefinite traits." This means that the psychology of individual differences must be carried forward by persistent and careful use of the methods of mental measurement that are now in process of development, that fundamental differences in mental formation must be discovered, that these differential factors must then be integrated, so that, finally, a scientific classification of mental types may be secured. Mental heredity opens a fertile field for investigation, and it holds out a promise of rich reward. "Eugenics rests upon a scientific basis . . . . Whatever differences

of opinion we may hold regarding the probable success of its methods, we must agree that civilized man may not indolently regard himself as 'God's domestic animal.' "

Bobbitt's paper is an address delivered at the Conference on Child Welfare, Clark University, July, 1909, and is devoted to a consideration of the ways in which "God's domestic animal" may improve himself. We are coming, says Bobbitt, to see that "a child cannot be molded to our will," that "human plasticity is not so great as has been assumed." In our present civilization two sinister influences are at work: "the upper and better strata of society are continually dying away, and poorer ones are being added on at the bottom." The more highly endowed classes furnish a smaller proportion of the coming generations: the more poorly endowed, the weaklings and the stupid are kept alive by our medicine, our hygiene, our public sanitation, and our charities, and are nursed and cherished in our schools. In earlier days, the blood of the race was kept high and pure by the fierce struggle for existence, but our racial stock is now unweeded. Hence the practical task of eugenics is to check these double ravages, to reverse nature, as it were, by encouraging strong and capable men and women seriously and consistently for long generations to undertake parentage, and by preventing the weak from mingling their weakness in human currents.

The writer reviews the measures that have been proposed for racial purification, e. g., the repression of the unfit by stringent marriage laws, by the segregation of the unfit, by the sterilization of criminals and defectives, or even by the abolition of all public agencies (charities, school systems, etc.) that tend to preserve the incapable. This last proposal is too drastic: the first is good, but insufficient: in general, public opinion must be educated up to any repressive measure.

Positively, economic legislation has been proposed to encourage fecundity (taxing the unmarried, paying bonuses to large families, etc.), but the evil is not primarily economic. If it could be infused into men, a greater potency would reside in the "eugenic religion" proposed by Galton, but this requires a degree of altruism never yet possessed by any religion.

G. M. W.

C. S. BERRY. *An Experimental Study of Imitation in Cats.* Journal of Comparative Neurology and Psychology, 18: 1908, 1-25.

This paper gives an account of some experiments which were made to determine how far imitation is a factor in the learning processes of the cat. The work follows the same lines as the author's previous study of imitation in white rats.<sup>1</sup> The subjects were four Manx cats, a mother cat and three kittens, all of whom were alert and active. The method followed was to give each animal an opportunity to perform a certain act or series of acts and if it failed, to give it a chance to learn by watching another animal do the deed. In each case of successful performance the animal obtained food.

Nine different problems were set for the cats to solve: (1) jumping from box to table; (2) opening door by pulling knot; (3) opening door by turning button and pulling loop; (4) getting food by turning button; (5) raising small trap door; (6) rolling ball into hole; (7) learning to catch mice; (8) getting meat out of a bottle; (9) getting down from top of cage.

In these experiments many instances of imitation occurred. The author classifies them as (1) instinctive imitation, (2) voluntary imitation, (3) automatic imitation. In examples of the first, instinctive imitation, one cat performed the same act as another cat without having had an opportunity to form an association with the reward to be obtained. Voluntary imitation occurred more slowly and usually as the result of seeing the trained cat perform the act and get food many times. Frequently the imitator also obtained food as the result of the first cat's act. No evidence of voluntary imitation was found in cases where the imitator only observed the performance of the act from another compartment. In cases of automatic imitation one animal which had already acquired the habit of performing a certain act would repeat it after seeing another cat do the same thing. This last the author considers important in the life of animals, which are more dependent than man upon external stimuli, in that it enables them to retain and profit by their past experience.

The author notes also that many times the imitation was not exact; for example, in doing the same act one animal would use teeth and another claws. "Certain elements of a given complex are likely to be singled out and these enter into the association to the exclusion, in large measure, of other elements."

<sup>1</sup>The Imitative Tendency of White Rats. Journal of Comparative Neurology and Psychology, 1906, 16, 333-361.

One interesting feature of the experiments is Doctor Berry's conclusion that his cats, at least, did not instinctively kill and eat mice but learned to do so by imitation. It may be that many other so-called instincts in animals are really the result of early training and experience. This fact should also make one hesitate in dealing with human beings to ascribe too much importance to instinct or heredity without a thorough knowledge of early environmental conditions.

The immensely important part which imitation plays in the lives of children is known but perhaps, too little appreciated by educators. Doctor Berry's work should serve to stimulate many interesting and precise investigations of imitation in children.

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Cambridge, Mass.

HAGGERTY, M. E. *Imitation in Monkeys*. Journal of Comparative Neurology and Psychology, 19: 1909, 337-445.

Imitation has always been assumed to be an influential factor in the mental development of monkeys. Many stories have been recorded of monkeys who voluntarily imitated human beings. Mr. Haggerty, in his paper on imitation in monkeys has described a series of careful and exact experiments made to determine to what extent monkeys voluntarily imitate one another. The general method employed is the same as that followed by Doctor Berry in his work with rats and cats. The animals used were eleven monkeys belonging to the two genera *Cebus* and *Macacus* and to seven different species. They varied in age, sex and individual characteristics. The apparatus consisted of a large cage built in sections; the sections contained different devices for testing the ability of the animal to obtain food for itself either independently or through watching another animal do so. The various devices were used in experiments designated as follows: (1) chute experiments A and B; (2) rope experiment; (3) paper experiment; (4) screen experiment; (5) plug experiment; (6) button experiment; (7) string experiment.

These seven experiments yielded a total of sixteen cases of successful imitation and five of partially successful imitation. Of the eleven monkeys two showed no tendency toward imitative behavior, two succeeded in some tests and failed in others, and the remaining seven were successful in every experiment given them. All of these cases come under the head of voluntary imitation but the author describes four well-defined "levels of imitative behavior." The first is characterized by the arrest

of attention, due usually to the movement of the animal imitated. In the second the imitator begins to follow the trained animal. A higher form is that in which the imitator attacks a definite object associated with the getting of food, and only gradually acquires the necessary skill to perform the proper act. The most perfect form of imitation is the exact repetition in detail of the act of another animal.

The author calls attention to the evidence that not only the act of the trained animal but also the profitable result of that act was a necessary factor in producing imitation.

The fact that monkeys stand nearest to man in the phylogenetic scale make these experiments of special value to those who are interested in racial development.

ADA W. YERKES.

Cambridge, Mass.

S. S. COLVIN. *The Ideational Type of School Children*. Pedagogical Seminary, September, 16: 1909, 314-323.

Previous investigations of ideational type have, in Colvin's opinion, been inconclusive, in part because the concept of types has been too gross (normal individuals are never exclusively visual or auditory-minded: the same individual uses different forms of imagery for different forms of thinking, etc.), and in part because we have had no standardized or reliable tests for the qualitative or quantitative determination of the types that do exist. The best tests for adults are doubtless those that are essentially introspective, but for children whose introspection is scanty and unreliable, the best form of test is probably that which employs an "indirect" method.

Dr. Colvin reviews briefly the experiments of Netschajeff, Pohlmann, Lobsien, Lay, Pentschew, Hawkins, Kirkpatrick, Pfeiffer, Pedersen, and Meumann, and describes his own tests of 700 school children and college students. The following are among the conclusions drawn: (1) "Writing, instead of being an aid to learning, is for children up to 10 years of age, a distraction." (2) "Children of the lower grades think predominately in concrete imagery, which in most instances is visual." (3) "This concrete imagery gradually falls off and is replaced by verbal imagery." (4) The concrete imagery of childhood aids recall in memorizing by facilitating the stamping-in (Einprägung) of impressions, whereas



the subsequent verbal imagery of maturer years "facilitates that aspect of recall which depends on association."

These conclusions, Colvin believes, have an important bearing upon the economy of learning. Defective imagery may handicap school progress as much as defective sense-organs. The normal, as well as the backward, child would profit if his instruction were better adapted to his mental type. A systematic determination of each child's type should be made from year to year.

G. M. W.

C. H. JUDD. *Journal of Philosophy, Psychology and Scientific Methods*, three articles: (1) *Doctrine of Attitudes*, 5: 1908, No. 25, 676-684; (2) *What is Perception?* 6: 1909, No. 2, 36-44; (3) *Motor Processes and Consciousness*, 6: 1909, No. 4, 85-91.

Reviewers often make mistakes. Some of the mistakes are made through carelessness, others through lack of knowledge. If the mistakes are of the former type, the reviewer should be censured or admonished; if of the latter, he should merely be enlightened. Such would seem to be the attitude of Professor Judd towards reviewers, for he has written the above three articles to clear away certain misconceptions with which some of them who reviewed his *Psychology: General Introduction* seemed to be possessed.

The *Doctrine of Attitudes* is an elaboration of the explanation of feelings as put forward in his book. The threefold classification of mental life into volitions, cognitions, and feelings is shown to be unsatisfactory from two points of view: (1) the classification gives no real place to such important aspects of mental life as interest and attention; and (2) it is very defective with regard to its treatment of feeling. Any elaborate analysis of feeling by psychologists has led to endless confusion. While it is easy to discern the difference between cognitions and volitions, it is found to be extremely difficult to discriminate between feelings on the one side, and cognitions and volitions on the other. Feelings according to one class of psychologists, must be analyzed into sensation elements before they can be known; to another they are identical with sensations; while to a third they are the preliminary steps towards volitional ends.

These troublesome difficulties are overcome by breaking away from the traditional threefold classification and substituting a new twofold classification—subjective elements and objective elements. These two,

while fundamentally different in character are vitally related to each other very much in the same way that force and matter are related. In this classification volitions, feelings, interest and attention are subjective, while sensations and cognitions are objective elements. That feelings can be recognized as distinct from sensory impressions is proven by striking a chord repeatedly. The sensory impression in all cases is practically the same—feelings are subject to great fluctuations. Hence feelings are defined as subjective reactions or attitudes, with which the individual meets the sensory impressions which go to make up his cognitions. Attitudes in general are subjective reactions which originate within the individual rather than in objective conditions.

The central idea of the second article *What is Perception* is that in perception we do not get a series of added factors; that perception is not a sum of the sensory elements of which it is composed, but rather that it is a simple, direct, compact, immediate process of recognition dependent for its explanation upon present conditions here and now at hand. Instead of an addition of factors we get a subtraction of factors with the place of the latter taken up by functional activities or tendencies toward reaction. To look upon the perceptual process as conditioned by an elaborate form of reasoning is to grossly misunderstand the economy of mental life, for percepts are advantageous just because they are simple and direct.

In the third article the person reviewed turns reviewer. Dewey's and McDougall's conceptions of the parts played by the motor processes in consciousness are found to be too general to give a definite answer to the question "what modification in consciousness will result from a modification in the motor outlet of a given stimulation?" Münsterberg, Royce and Baldwin, on the other hand, have advanced theories which are not sufficiently comprehensive. "One needs," says Judd, "a formula which is at once comprehensive and capable of application to specific cases of various kinds." The formula according to Judd is that mental organization and unity are always motor in character; and that percepts and ideas are due to distinctive motor processes. Thus Judd would say that if two things are recognized as alike it is not through identity of retinal excitations, but that the retinal sensations (which, by the way, are never identical) act as a cue to reactions of the same type. Any retinal impression will do if it gives a cue for right action. Only in this way could we pass through life with its infinitude of sensations without becoming hopelessly confused.

PETER SANDIFORD.

Teachers College.

E. L. THORNDIKE. *A Note on the Specialization of Mental Functions with Varying Content.* *Journal of Philosophy, Psychology and Scientific Methods*, 6: 1909, No. 9, 239-240.

At one time the mind was looked upon as a non-differentiated unity. The mind, like a gas bag or tank of water, was supposed to be equally affected throughout by a disturbance of any given part. Next came the faculty psychology which divided up the mind into a series of segregated compartments, one for reasoning, another for memory, and so forth. Investigation of pathological cases pointed to the fact that it was more than probable that the simplicity of the mind was wholly a myth. But it was not until the statistical interpretation of experimental psychological data by Thorndike and others that the extreme complexity of the mind and the independence of the various capacities was realized.

In early investigations Thorndike had neglected to take into account the reducing influence of chance variations in the original measures upon his inter-correlations. He now wishes to see what kind of results would be obtained if he allowed for, or removed this disturbing factor. The test was to draw (1) a line equal to a 100 mm. line; and (2) a line equal to a 50 mm. line. The relation between the accuracies of the two series was calculated. The records were obtained for 30 trials for each length with 37 individuals, young women from 19 to 23 years of age, all in the same class and all very closely of the same degree of mental maturity. The probable true correlation was  $+.77$ . This means that the accuracy in drawing a 50 mm. line is only 77 per cent of the same person's accuracy in drawing a 100 mm. line. Or, in other words, the chance of the accuracy in drawing a 50 mm. line equaling the accuracy in drawing a 100 mm. line is as  $77 : 100$ . Since the correlations of the mental or the physical traits of twins are in the neighborhood of  $+.78$  a woman's ability to equal 100 mm. lines is so little or no more like her own ability to equal 50 mm. lines than it is like her own twin sister's ability to equal 100 mm. lines.

Such a state of affairs seems preposterous. But the fact remains and, until more elaborate measures are made, it must apparently be accepted. . . . Our traditional psychology has been unable to deduce even very simple relations, and this inability implies that it does not know what the functions are which it names and pretends to describe.

PETER SANDIFORD.

Teachers College.

C. H. JOHNSTON. *Tendencies in College Departments of Education*. Educational Review, 38: September, 1909, No. 2, 186-190.

Professor Johnston has examined eighty catalogues, representing six state and two endowed universities for the ten years, 1897-1907, with the purpose of determining prevailing tendencies in the departments of education. He finds that there is still much overlapping of courses and much confusion of nomenclature. This lack of clear definition in educational science indicates a lack of effective organization of subject matter; hence one is not surprised to find that, while Ph.D. men are more numerous in the professional ranks than ten years ago, most of the Ph.D. material has been drawn from other departments. The proper relation of psychology to education seems still to be a matter of uncertainty, for the psychological aspects tend to be either over-emphasized or under-emphasized in most institutions. It is also interesting to note (and comforting or otherwise according to one's point of view) that the Herbartianism that was so widely dominant in educational psychology ten years ago is being discarded in favor of the functional and genetic methods of approach. Professor Johnston believes that the elective system has militated against the proper preparation of students of education in the basic disciplines of biology, psychology, sociology, and history.

W. C. B.

R. P. FALKNER. *Retardation: Its Significance and Its Measurements*. Educational Review, 38: September, 1909, No. 2, 122-131.

The recent studies of Ayres, Cornman, and others upon "retardation" in the lower grades, like the earlier investigations of Thorndike, have stimulated public-school men to examine critically the data upon which these studies are based and the methods by means of which their conclusions have been reached. In this article Dr. Falkner comes gallantly to the rescue of the statisticians and takes issue very sharply with some of their critics. His rejoinder is directed chiefly against Greenwood's contention that the retardation investigations have employed an "age standard" for their determinations rather than a "progress standard." The former is based upon the number of pupils in each grade who are above the normal age for that grade. This may mean, of course, that pupils were late in entering school, or it may mean that their progress in school has been retarded. The "progress standard," on the other

hand, is based upon the length of time that it takes a pupil to do a year's work, and consequently measures real retardation much more accurately.

Falkner analyzed the statistics of several city systems, applying the "progress standard." So far from discrediting the conclusions of the statisticians, based on the "age standard," his results show an even more alarming condition. In the city of Boston, for example, *46 per cent.* of the class graduating from the grammar schools in 1897 required more than the stated period to cover the elementary course, while, for the same year, the age-retardation in the fourth-grade classes of the same system was only a fraction over *29 per cent.* A similar condition is found in all of the cities examined except one.

It seems to the reviewer that a collection of statistics of retardation in foreign schools, and especially in German schools, should be next in order in this series of investigations. If we are worse than Germany in this respect, it can scarcely be maintained that retardation is due entirely to mal-nutrition, unhygienic conditions, or the lack of a content that will stimulate pupils to effort. While these factors are doubtless operative, it is barely possible that some blame must be attached to the fact that "keeping pupils back" is often the only effective method that American teachers can resort to in order to maintain the required standard.

W. C. B.

JOHN DEWEY. *Moral Principles in Education.* (Boston: Houghton Mifflin Company, 1909. Pp. x, 60. 35c.)

We must distinguish between moral ideas and ideas of morality; between moral education and direct moral instruction. In the moral training given by the school community, we should not permit the training which tends to be narrow, pathological and formal; school life should train for many social relations and develop self direction and leadership in school activities typical of social life. In the moral training from methods of instruction, we should seek active social service, inculcate positive motives and standards, and center interest in present activities as opposed to remote success as an end. The course of study influences the conduct of the school, is the means of realizing social situations, represents merely phases of a unified social life, is controlled by social considerations, presents typical phases of social development, offers contrast and consequently perspective, and teaches the methods of social progress. This is illustrated in history, geography, and mathematics.

Psychologically, conduct is a mode of individual performance; native instincts and impulses are the sources of conduct; moral ideals must be realized in persons; character is a system of working forces; force is a necessary constituent of character and implies intellectual judgment, good sense, and delicate emotional responsiveness. The school must be judged by ethical standards.

Thus runs the argument in this forceful and sound little manual on *Moral Principles* which is an interpretation of consistent psychology, ethics and sociology with reference to moral education in the school.

C. E. S.

J. PAYOT. *The Education of the Will: the Theory and Practice of Self-Culture*. Authorized translation by S. E. Jelliffe. (New York and London: Funk and Wagnalls, 1909. Pp. xxiv, 423.)

This is an English translation of a well-known French book which, appearing first in 1893, reached its twenty-seventh edition in 1907. M. Payot, who is rector of the Academy of Aix, addressed his book especially to students. It is written in an easy, fluent style, replete with concrete illustrations. Its psychology is that of the orthodox French school, and the book is dedicated to Ribot. Its value, however, lies in the wholesome character of the advice that it gives to young people. Especially noteworthy is the frank manner in which the author warns his young readers against the sophisms of the sensualist. High-school principals who are seriously attacking the problem of character-building will find the book very suggestive.

W. C. B.

## NOTES AND NEWS

In a recent number of *Science* a writer urges the establishment by the United States government of experimental schools, similar to the agricultural experiment stations now found in almost every state. It is argued that vastly more important results would accrue from such systematic experimental human culture than from the experimental agriculture, the value of which is now so generally recognized.

Prof. E. B. Titchener has been appointed Sage professor of psychology in the recently established Graduate School of Cornell University. Professor Titchener is to be free to devote his attention exclusively to research work.

Educators in Italy are discussing the reform of the Normal School. They demand an extension of the course of study, in order that their teachers may be provided on the one hand with a broader cultural foundation, and on the other with a more adequate professional training. The situation is complicated by the fact that the Normal School is practically the only secondary school for women in Italy. The discussion seems to center at present about the relation of the Normal School to the University.

The Institute of Experimental Psychology and Pedagogy of Milan recently signalized the successful completion of its first year. The Director of the Institute, Professor Treves, has been greatly assisted in his work by the active collaboration of the teachers of Milan, and has thus been able to place at the disposal of the schools the technique and equipment of modern psychological research.

According to *Science* an excellently equipped laboratory devoted to experimental psychology has recently been opened at the University of Oxford, and efforts are being made by the University of Cambridge to increase the facilities for experimental psychology in that institution by the erection of a new laboratory. An offer of \$15,000 has been made on condition that the building is begun without delay.

The psychological clinic of the University of Pennsylvania has greatly extended the range of its activities this winter. Arrangements have been made whereby teachers and parents throughout the State of Pennsylvania may receive advice on cases of retarded children through the medium of correspondence, and lecturers are sent out to address teachers' meetings and to give suggestions as to the proper treatment of defectives.

Dr. J. W. Baird, professor of psychology in the University of Illinois, has been called to Clark University to occupy the position recently made vacant by the appointment of Professor Sanford as President of Clark College.

The faculty of Middlebury College, Middlebury, Vt., announces a new, four-year pedagogical course beginning next September.

Prof. Karl Pearson of London is at present engaged in the collection of statistics by means of an elaborate questionnaire on the relative importance of heredity and home environment in the development of children. Professor Pearson expects to have his results ready for publication by May, 1910.

An arrangement has been effected by Teachers College, Columbia University, whereby professors may be absent on leave during the regular year for a period equal to the time spent in teaching in the summer school. As a result a fuller offering of courses is made for next summer than ever before in the history of the school. Among those giving courses are Professors Thorndike, Monroe, Dewey, McVannel, McMurray, Strayer, Johnson, Smith, and Dow.

The Department of Superintendence of the National Educational Association meets at Indianapolis, March 1, 2 and 3, 1910. The following societies will meet at the same time and place; the Society for the Scientific Study of Education, the Society of College Teachers of Education, the National Convention of Agricultural Education, the American Physical Education Association, The American School Hygiene Association, the Public School Physical Training Association and one or two others.



We regret to record the death of Dr. William T. Harris, United States Commissioner of Education, 1889 to 1906, author of *The Psychologic Foundations of Education*, and one of the most prominent figures in the educational world.

Another advance in legislation on eugenics is reported from Connecticut where a bill has been passed providing for surgical operations to prevent procreation by those persons who would produce children with an inherited tendency to crime, insanity, feeble-mindedness, idiocy, or imbecility. Similar laws have been enacted in Michigan and Indiana.

Philadelphia is trying an experiment with 2400 pupils in eight schools to determine whether the provision of a nutritious midday lunch of soup, milk, and rolls will affect an appreciable improvement in the physical condition and intellectual efficiency of the pupils. In four schools there will be uniform and systematic feeding, in the other four 'control' schools the pupils will continue to pick up food or go without as they have in the past. If the experiment warrants it, the Board of Education may institute a system of lunches to be served free or at a minimal cost.

PUBLICATIONS RECEIVED TO JANUARY 1, 1910.

ELIZA R. BAILEY and JOHN M. MANLEY, Ph. D. *The Teaching of Spelling*. Pp. 16. *The Bailey-Manley Spelling Book*. Pp. 154. Boston: Houghton Mifflin Company, 1908. 25c.

GEORGE HERBERT BETTS. *The Distributions and Functions of Mental Imagery*. Teachers College, Columbia University, Contribution to Education, No. 26. New York: Teachers College, 1909. Pp. 99.

A. S. DRAFER. *American Education*. Boston: Houghton Mifflin Company, 1909. Pp. x, 383. \$2 net.

CHARLES W. ELIOT. *Education for Efficiency and the new Definition of the Cultivated Man*. Boston: Houghton Mifflin Company, 1909. Pp. viii, 58. 35c.

ISABEL McISAAC. *Bacteriology for Nurses*. New York: The Macmillan Company, 1909. Pp. xii, 179. \$1.25 net.

W. A. McKEEVER. Home Training Bulletins: No. 1, *The Cigarette-Smoking Boy*, pp. 11; No. 2, *Teaching the Boy to Save*, pp. 14; No. 3 *Training the Girl to Help in the Home*, pp. 15; No. 4, *Assisting the Boy in the Choice of a Vocation*. Chicago: The A. Flanagan Company, 1909. 5c. each.

HENRY RUTGERS MARSHALL. *Consciousness*. New York: The Macmillan Company, 1909. Pp. xv, 685. \$4. net.

S. H. ROWE. *Habit-Formation and the Science of Teaching*. New York: Longmans, Green and Company, 1909. Pp. xvii, 308.

ELEANOR HARRIS ROWLAND. *The Right to Believe*. Boston: Houghton Mifflin Company, 1909. Pp. xv, 202. \$1.25 net.

P. SOLLIER. *Le Doute*. Paris: F. Alcan, 1909. Pp. viii, 407.

# THE SPAN OF VISION IN READING AND THE LEGIBILITY OF LETTERS

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## SUMMARY

1. The span of distinct vision for letters in 10 point type at a distance of 35 cm. from the eyes was found to be from 20 mm. to 22 mm. on either side of the fixation point. It has been shown by other investigators that the distance between fixations varies from 10 mm. to 20 mm. It would seem, therefore, that in ordinary reading all the letters read must come within the field of distinct vision, and that probably the fields of distinct vision overlap in successive fixations.

2. Broad letters were the most legible. Narrow letters and some of the tall ones were found near the end of the series. Confusion between letters was apt to take a definite direction, *e. g.*, *f* was judged *t* more often than *t* was judged *f*.

3. The results of these experiments are in accord with Dor's tests of the acuity of peripheral vision by means of dots.

The problem of this experiment was the determination of the width of the field of distinct vision for each letter of the alphabet. The first part of the problem, the width of the field, was suggested by the work done by other investigators on the fixation pauses in reading. The second phase of the problem, the relative legibility of the letters of the alphabet, was a natural outgrowth of the first. It was thought that it might be interesting to determine, if possible, whether some of the letters might not be worthy of some change in order to facilitate reading.

It has been found by Dearborn (1), Huey (3) and others that in ordinary reading the eye does not pass evenly along the line, but by jerks and pauses. It was computed by Erdmann and Dodge (2) that 12/13 to 23/24 of the time is spent at the fixations and they argued on the basis of measurements by Dodge of the angular velocity of the eye movements that, if the rate held good for reading, it did not permit of eye perception during the interval. The work of both Dearborn and Huey on the speed of eye movement confirms the results of Dodge on this point. Dearborn also found by the photographic method the average number of fixations for four subjects to be about 6.1 for a line 96.5 mm. long. Huey's experiment with a bristle attached to the eye by means of the eye cup gave for a line 98 mm. long an average of 4.8 fixations for one subject and 4.5 for the other.

These results were the principal factors in suggesting our problem. Is it possible for all the line to be perceived, or must a part be filled in from the context? To determine this, isolated letters were used. While this method does not prove that all the line between two fixation points is assimilated, it will show whether all is within the field of distinct vision.

The letters, 10 point Roman, old style, were arranged upon cards, one on either side of the fixation point. The method made certain that the central point would be fixated, *not* the letters. Two letters did not seem too complex, and at the same time they allowed for the securing of twice the number of results. The method of placing the letters on the cards presented a problem. At first the letters were cut from a current magazine and pasted on the cards. The difficulty with this was that the shadows about the letters often confused the subject. We finally hit upon the plan of printing the cards with steel type and a small hand press. This was a long, tedious process, as every card differed from every other either in the letters combined or in the distance between them, but the result made the work worth while. The distance between the letters ranged from 10 mm. to 80 mm. The distance increased by steps of 2.5 mm.

The cards were exposed in the Dodge mirror tachistoscope. This consists of a box with two apertures and mirrors so arranged

that the light admitted through one aperture is reflected by a mirror to the fixation point, and thence it is reflected to a transparent mirror set at an angle of  $45^\circ$ . Though a part of the rays pass through the transparent mirror, the other part is reflected to the eye of the observer. Through the other aperture the light is similarly reflected to the eye. This time the rays passing through the transparent mirror reach the eye. In this way a fixation point is obtained which is the same distance from the eye as is the card containing the letters. A Cattell fall chronoscope was placed between the source of light and the aperture leading to the letters. The other aperture was left open. For a part of the work a one hundred candle power electric bulb was used, but it was found that during the summer months sunlight reflected by means of a heliostat was more satisfactory, as it gave a light on the cards more nearly equal to the diffuse daylight that is used for ordinary reading. The cards appeared 35 cm. from the eyes. They were exposed for  $59\sigma$ , which while it may seem longer than necessary, is short enough to make eye movements during the exposure impossible. However, the time of actual exposure might be considered less than  $59\sigma$  for when the shutter first begins to fall, the amount of light is not sufficient to make the letters legible even at the fixation point; the full intensity of illumination of the letters is not obtained until the aperture in the shutter coincides exactly with the aperture in the tachistoscope.

The subjects used in this experiment were university men with normal vision, with the exception that P. was astigmatic (.375 D. and .50 D.) and did not always wear glasses. Generally the cards were arranged in series according to the distances between the letters, but occasionally they were given in mixed order. As this seemed to cause no variation in the results the series were considered reliable and more convenient. Over five hundred cards were used, and, as the order was changed for each day's work, there was no possibility of becoming familiar with a series. For fear of this possibility the results were compared each day but there was no change that would indicate increased adaptation of any kind. For the three subjects used over 15,000 expos-

ures were made, exclusive of those that were for any reason considered unreliable. As there were two letters on each card, and these were used separately, there were really over 30,000 results obtained.

TABLE I

LETTERS	W					P					D				
	DISTINCT VISION		LIMEN OF LEGIBILITY		LETTERS CONFUSED	DISTINCT VISION		LIMEN OF LEGIBILITY		LETTERS CONFUSED	DISTINCT VISION		LIMEN OF LEGIBILITY		LETTERS CONFUSED
	Left	Right	Left	Right		Left	Right	Left	Right		Left	Right	Left	Right	
a	15	15	22.5	30	u s	20	20	25	22.5	a n u s	15	22.5	22.5	32.5	n u
b	20	30	27.5	40	h u	25	20	32.5	25	h k	17.5	27.5	25	35	h
c	17.5	17.5	27.5	30	e o	17.5	17.5	20	25	e o g	12.5	15	20	22.5	e o n
d	32.5	35	37.5	40		30	30	35	37.5	n	30	25	37.5	35	
e	12.5	17.5	17.5	20	c s g	12.5	17.5	20	22.5	o c s	15	12.5	20	17.5	o c g
f	7.5	10	15	12.5	l t i j	15	15	22.5	20	i t l	20	10	25	15	l t
g	32.5	20	37.5	35	s	27.5	20	30	25	z	25	17.5	27.5	27.5	s
h	10	17.5	15	27.5	b n k	12.5	22.5	15	27.5	b k	15	17.5	20	25	b
i	15	7.5	20	15	j f l t	12.5	17.5	17.5	22.5	j t l	20	20	25	25	j
j	12.5	17.5	20	37.5	i l	12.5	17.5	17.5	22.5	l i	27.5	15	32.5	25	i l
k	25	35	40	40	h t	32.5	27.5	37.5	32.5	g x	25	32.5	35	37.5	
l	15	12.5	20	17.5	j f t	7.5	17.5	12.5	22.5	i j t	15	20	25	25	f j
m	35	32.5	37.5	40		37.5	35	40	40	n	30	35	37.5	40	
n	12.5	12.5	17.5	17.5	m u	20	17.5	27.5	25	a u m	15	17.5	20	25	u m
o	32.5	32.5	35	40	n c	25	25	32.5	32.5	p n	25	20	32.5	27.5	n a
p	32.5	32.5	35	37.5	q m	22.5	20	35	25	m n	25	27.5	30	37.5	o
q	32.5	20	35	37.5	o	22.5	20	27.5	27.5	n o	22.5	20	27.5	32.5	
r	32.5	20	35	35	t	20	27.5	25	32.5	f	22.5	20	30	27.5	t f
s	15	20	22.5	35	g	25	20	27.5	22.5	e g	17.5	17.5	22.5	25	a g
t	12.5	20	17.5	25	r f	30	22.5	37.5	27.5	f l	17.5	20	22.5	25	f
u	15	20	22.5	35	n a	10	10	20	20	m n	17.5	17.5	22.5	25	n
v	15	20	20	30	y w	20	25	27.5	30	y	15	22.5	20	30	u
w	30	35	32.5	40	v	40	25	40	35	v	27.5	25	32.5	37.5	
x	25	35	32.5	40	y v	20	30	25	35	w y	20	17.5	27.5	30	a v
y	20	25	32.5	37.5	v	22.5	32.5	30	37.5	v	17.5	17.5	30	30	v
z	15	20	27.5	35	x g	22.5	30	27.5	32.5	x s t	20	17.5	25	25	g a

The results for the letters on both sides of the fixation point are given in Table I. As the object was to test the span of vision in normal reading, both eyes were always used. The limen of distinct vision was taken to be at that point where the letters

were judged incorrectly 10 per cent of the time and 50 per cent of wrong cases were assumed to give the limen of legibility. The subject always reported cases that seemed doubtful and all cases that were indistinct or blurred. The latter were always discarded as probably due to a lack of accommodation. Doubtful cases were not counted, for or against, unless it was uncertain just where the limen should be. In such cases the number of correct doubtful judgments was compared with the number of incorrect doubtful judgments. In the last column for each subject are given the letters most frequently confused with the given letter.

The average limen of clear vision for all letters on both sides of the fixation point for W. was 21.5 mm. with a mean variation of 7.3 mm.; for P. the limen was 22 mm. with a mean variation of 5 mm.; and for D. the limen was 20.3 mm. with a mean variation of 5 mm. This large variation is what might be expected from the great dissimilarity between the different letters of the alphabet but a large variation might be shown with each letter from day to day. Each subject had his peculiarities; W. was inclined to work harder when he thought he was not getting correct results and to be less attentive when he thought the letters were more distinct. The result was that when he was most confident, he frequently made mistakes. P. was apt to be predisposed in favor of certain letters, which he often reported for letters decidedly unlike. His favorites were m and n. These were often given for a, d, o, p, t, and x in addition to being interchanged with each other, m being more frequent.

The most recent work of this kind with which these results may be compared is that of Ruediger (5). Unfortunately for the comparison his work covers a much broader field, in which a large number of subjects are tested. Consequently, the time devoted to any particular phase of his subject has been minimized. The small letters n and u were used in testing the field of distinct vision, which was only a part of his problem. If we compare his results for ten subjects with these letters with our results for the same letters, we find that for an average of 90.7 per cent. of right cases he gets as a result 25.8 mm. on either side of the fixation point, while for n we get an average of 15.8 mm. on each side and

for u, an average of 17.5 mm. to the left and 20.8 mm. to the right. This is not an exact comparison, for in as much as he used only two letters, there was not the chance of wrong cases that there would have been had he used all the letters of the alphabet. Perhaps it would be more correct to compare his results for 95 per cent. of right cases with our 90 per cent. of right cases. In that case his values would more nearly approach our own.

If we accept our own results as valid, and take Dearborn's and Huey's results on the number of fixations per line, we find that, with a very few exceptions, the distance between fixations lies within the limen of distinct vision. According to Dearborn the greatest distance between fixations was 19.3 mm. and the least was 9.65 mm. Huey found for two subjects that the average distance was 20.4 mm. If we take the sum of the limens of distinct vision for each letter to the left and to the right of the fixation point, only two instances will be found in which the limen is less than the greatest distance between fixations that was found by either of the above observers. The limen for W. in the case of f is 17.5 mm. and for P. in the case of s it is 20 mm. This would seem to indicate that all that is read must come within the field of distinct vision in normal reading. In fact it would seem that the fields of distinct vision for different fixations may overlap.

In Table II is shown the relative legibility of the letters for each subject, both at the limen of distinct vision and at the limen of legibility. It will be seen that the letters not only do not follow the same order for all three subjects, but do not follow the same order at both points for the same subject. It is quite natural that there should be individual differences of certain forms, though we should hardly expect differences in the same subject. This may be explained partially on the ground that certain letters preserve their identity to a greater degree as we approach the field of indistinct vision than do others. Thus, for example, it would seem that for W. the letter k occupies fourth place in distinct vision and first as we approach the limen of legibility, because its form had certain advantages in indistinct vision that m, d, o, p, w, x, did not have, whatever these advantages may be.



TABLE II.

LIMEN OF DISTINCT VISION.				LIMEN OF LEGIBILITY.		
mm.	W.	P.	D.	W.	P.	D.
40				k	m	
38.7				dm		m
37.5				o	w	
36.2		(m)		gpqwx	d	dk
35				ry	k	w
33.7	md			b	y	
32.5	opwx	(w)	(m)		o	p
31.2				z	sz	
30	(k)	(dk)			prtx	boqy
28.7			k	cjsu	vb	jrx
27.5		y	d		agq	ag
26.2	gqr	tz	wp	a	n	
25	b	ox		v		lvz
23.7		gr				istu
22.5	y	bsv	bo		e	hn
21.2		pq	gjqr	th	efh	e
20		a	i		iju	f
18.7		n	atvxz	el		e
17.5	esuvz	ch	lsuy	in	l	
16.2	t		hn			
15	aej	(efij)	f			
13.7	hl		c/e	f		
12.5	n	l				
11.2	i					
10		u				
8.7	(f)					

Sanford (6) measured the relative legibility of letters by the distance from the eye at which they could be recognized, and also by the time necessary to correctly perceive them. The order of legibility for two subjects working with the small letters from Mind groups as follows:

|| B.—dpqmyknw ogvxhbjlia tuzrsefe  
 || M.—mqophbnv yudiwkgjrt xaczlfse

While there are some points of agreement, there are some striking points of disagreement between his results and our own. Perhaps the most noteworthy is the letter n, which appears in the first group for both of Sanford's series, but is found nearly the poorest letter in the results in our table. Both are agreed, how-

ever, upon many of the letters. The broad letters seem the most effective, while the short letters and some of the tall letters are found near the end of the series.

Though some letters were quite frequently confused, this confusion was apt to take a definite direction with our subjects. Such letters as t and f, for example, were quite frequently confused, but f was more apt to be judged as t than t as f. The same was true of c and e in a less degree. Just what changes it might be profitable to make where such confusions occur it would be difficult to point out. As Sanford suggests, a slight change that would make certain letters less confusable would be likely to make others more uncertain.

In conclusion it might be interesting to compare the result obtained with letters with the results obtained with other measurements of peripheral vision. For comparison take the work of Dor (4, p. 348) on the limen of twoness in which he used dots. Snellen (4, p. 353) formulated the equation for visual acuity,

$$V = \frac{d}{D},$$

where D represents the distance at which the letter

makes an angle on the retina of 5' and d represents the distance at which the letter is seen. If we assume this equation to apply to our letters, and consider only the height of the small letters, we find the visual acuity should be approximately 3/10. Of course this would not necessarily be exact, as these letters are not of the same form as the Snellen test type. The letters used were the short letters which were 1.75 mm. high and, as will be remembered, were exposed 35 cm. from the eye. Dor found with dots that 5° from the fovea the acuity of the retina was one-fourth that of the fovea. The visual acuity for our letters at that point, therefore, should be 12/10. In other words they should disappear a little less than 5° from the fovea. The results for some of these short letters are given in Table III.

TABLE III.

	a	c	e	n	x	z
W.	4°18'	4°21'	3°03'	2°52'	5°15'	5°55'
P.	3°52'	3°41'	3°29'	4°20'	4°54'	4°54'
D.	4°29'	3°29'	3°03'	3°41'	4°05'	4°41'

It will be seen that the average is approximately  $4^{\circ} 04'$  though some of the letters did not disappear until considerably past  $5^{\circ}$ . The average, therefore, compares quite favorably with Dor's dots. The difference of the individual letters would have to be explained on the basis of the apperceptive process in the recognition of the letters. Certain general forms are known to belong to particular letters, or groups of letters, or, to put it conversely, certain letters must be grouped as belonging to a certain general form.

Thanks are due Professor Pillsbury for suggesting the problem. I also wish to express my appreciation of the services of Professor Pillsbury and Dr. Woodrow in acting as subjects. Dr. Shepard also offered many suggestions that were of value in working up the results.

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# THE SUBNORMAL CHILD IN NEW YORK CITY SCHOOLS

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From an educational point of view, there are, broadly speaking, two general classes of children, the normal and the abnormal. The normal children, though differing widely among themselves as to capacity, capability and ability, are all capable of meeting with reasonable efficiency the educational standards of the day and cause little or no anxiety to the educationalist. The abnormal children on the contrary are the pedagogic problem of the hour. There are without doubt two kinds of abnormal children, which for convenience we may call the supernormal and the subnormal.

The supernormal children furnish the geniuses, the precocious and exceptionally bright individuals, who never exactly fit into the ordered existence of everyday life, but are always forging ahead of the great mass of humanity, or in other words, the leaders, thinkers, specialists, and great men and women of the world. The subnormal children, in striking contrast, furnish the physical and mental defective problems of the educational world, and in later life are found among the inefficient, parasitic, petty criminal classes, which form the shadows of the great panoramic picture of life. None of the abnormal individuals, then, can be said to be aught but "misfits" in life, and the thoughtful educationalist turns his attention to them, asking "Why are they misfits?" and "Wherein can their fortune be altered?"

Long ago educational theory and practice established a firm working basis for the instruction of the normal child, and for some time pedagogues have been occupied with attempts to embellish method and matter in this field, but latterly they have come to the sound conclusion that, since it is the child and not the curriculum

which must be taught, many departures from the established, customary normal education must not only be tolerated but must also be encouraged. This is especially true for the subnormal child, and special instruction for exceptional, abnormal, atypical, or defective children, has invaded the educational systems of the world to stay. Therefore it behooves those who would be abreast of the times to know what is being done along these lines.

The problems of the subnormal child have been energetically grappled with in many countries, and there is a widespread educational interest in the special instruction of the crippled, the deaf, the blind, the mental defectives or aments, and the physical defectives or anemic, tubercular or adenoid children. Space does not permit the treatment of all these forms of special education; suffice it to say that the problem of the crippled, deaf, blind, and physical defectives is the problem of counteracting deformity, or abnormality of a physical, but not necessarily a psychical character; it involves coöperation between the professions of medicine and pedagogy in a very large degree.

We are chiefly concerned here with the problem of the ament or mental defective, wherein the deformity or abnormality may be, and usually is, largely physical but also psychical in character. This form of problem involves the physician, the pedagogue, and the psychologist.

As early as 1859 Germany began the public school education of mentally deficient children. Institutional care of the idiotic and imbecile was begun several years before almost simultaneously in Germany and France. In 1903, after forty-four years of study and effort, the German educational system was caring for approximately 25 per cent of its aments. Following the Teutonic lead in education seems to be a pedagogic disease and other countries caught this altruistic contagion of educating the ament. In the United States the public school care of these mental defectives began less than twenty years ago and in the city of New York, with which we are principally concerned here, the start was made exactly ten years ago in Manhattan. The results will be discussed in this paper.

As the pioneer, Germany had many experiments to make and

after nearly half a century of experience she has evolved a typical military system in the care of the ament. Special schools for mentally defective children are scattered widely over the German empire today. To these schools children are admitted by the following system: A child who is a laggard in his school work is reported by his teacher at the end of the second year in the same class. Following this report the child is examined by the principal and if in his opinion there is mental cause for this retardation, the child is reported to the principal of a special school. The district superintendent, the principal of the special school, and a physician then make a joint examination of the child and if in their opinion he is a mental defective he is admitted to the special school for a probationary period of three months, at the end of which time he is either (1) returned to his regular school with special directions to his teachers, or (2) admitted to the special school as an educable ament, or (3) transferred to an institution as an imbecile, idiot, or ineducable ament and therefore a menace to the public weal if left at large.

This German method is followed with slight modifications in England also, and in both countries the result is the segregation of the aments and a tendency for the schools to be called "Fool Schools," or some other such euphonious name. The effect is to educate the ament for competition in after life with his peers, but the salient point is herein overlooked, namely that when he leaves these schools he goes forth into a community of his superiors and is unacquainted with their ways and largely incompetent to meet the demands of such a community life. Therefore England and Germany are struggling today with the vital problems of "after-care" for the educated mental defective.

Following the lead of Germany and England public school education of the ament was developed in the United States, but it has developed, at least in New York City, along very different lines. No attempt is made to permanently segregate the aments in special schools, and in every way possible competition with normal children during recesses, in games, etc., is encouraged, in order that the ament may in a measure mature in the midst of the community in which he must later live.

Within our limits it is practically impossible to do more than outline the history of the growth of this special education in the City of New York. The first provision was made in 1899-1900 by the organization in Manhattan of one class for aments and some special classes for "backward children," but for various reasons the progress was slow until 1906-1907 when a department of Ungraded Classes was officially organized by the Board of Education. By carefully gathered statistics it has been estimated that there are approximately 7000 children in the schools of Greater New York City who, as mental defectives, are entitled to the special education of these Ungraded Classes. In 1905 there were 18 classes, caring for 391 children (or about 6 per cent of the total number), established in the city; in 1909 there are approximately 100 classes, caring for over 1700 children (or about 25 per cent of all cases). These facts show what numerical progress has been made since the organization of the department.

The growth of the work in other lines has been of similar character. An inspector of classes was appointed in 1906 as a result of a competitive examination, and the individual so chosen, Miss Elizabeth E. Farrell, had been the successful teacher, since 1899-1900, of the original class for mental defectives. A physician was also appointed to assist in the examination, care, and tabulation of these Ungraded Class children, and the active coöperative work of Miss Farrell and Doctor Isabelle Thompson Smart began in January, 1907, on the basis of the 18 existing classes and the 94 per cent of unexamined or unassigned mentally deficient children in the public school system.

Briefly the mechanics of organizing classes for this department are as follows: At the beginning of each term, i.e., September and February, application forms are forwarded to the principals of the schools (Form A.) on which they are requested to report, to the city superintendent's department, furnishing for each laggard, who in their opinion or that of their teachers is a candidate for the Ungraded Class, the data asked for in the form. Following, as soon as possible, the receipt of these applications the school or district is visited by Dr. Smart, the children, as reported, are examined and the results of each examination recorded on the medical

Form A.

OBSERVATIONS ON CHILD PROPOSED FOR AN UNGRADED CLASS

P. S.....Borough.....

Name..... Address.....

Age..... Grade..... Nationality F..... M.....

Yrs. in U. S..... Home Conditions.....

Health Record: Nutrition..... Bone Dis..... Enl. Gl.....

Teeth..... Throat..... Nose..... Vision R..... L.....

Hearing R..... L..... Nervous Disease.....

School Records: Kn'dg.....terms 1A.....terms 1B.....terms

2 A..... terms 2B..... terms 3A..... terms 3B..... terms

Sp'c'l..... terms. School Att..... Cause of Irreg.....

Absence in last two terms.....Attention.....Memory.....

Oral Exp..... Hand Work..... Phys. Tr..... Number.....

Reading..... Writing..... Sp. Tastes.....

Disposition..... Behavior..... Habits.....

Peculiarities .....

.....

Other Information .....

.....19.....

Principal



Form F.

## SPECIAL MEDICAL EXAMINATION

P. S. .... Borough. .... 19 ..

Name .....

1. General Condition.....

    A. Anatomical.....

        Cranium .....

        Facial Asymmetry.....

        Palate .....

        Teeth.....

        Tongue ..... Lips.....

        Eyes.....

        Ears.....

        Limbs .....

        Skin .....

        Body in General.....

    B. Physiological .....

        1. Motor Function.....

            Tics ..... Tremors.....

            Epilepsy ..... Nystagmus.....

            Promptness ..... Coördination.....

            Prehension R. .... L. .... Gait .....

            Speech..... Fatigue .....

        2. Sensory Function.....

            Eyes R. .... L. .... Ears R. .... L. ....

        3. Condition of Heart..... Pulse .....

    C. Psychical .....

        Balance ..... Proportion ..... Moral Sense.....

        Attention ..... Memory ..... Will.....

        Peculiarities .....

    D. Development—Att. Diseases.....

    E. Family History: Births ..... Miscar ..... Deaths.....

        Cause of ..... Diseases F. .... M. ....

Medical Examiner

Recommendation .....

Inspector Ungraded Classes.

examination blank (Form F.) in duplicate. If in the judgment of Dr. Smart and Miss Farrell, who also examines these candidates on pedagogical lines, a child is considered mentally deficient or eligible for the classes, he is assigned to the nearest Ungraded Class in the district, in which there is a vacancy, or is placed in a new class as quickly as one can be organized and a teacher obtained. In all cases, Dr. Smart makes recommendations, wherever necessary, for medical or surgical treatment, as to eye-glasses, ear defects, care of teeth, throat, etc., recommending treatment for the family physician or suggesting clinics or dispensaries where treatment can be obtained,—and the cases not needing some such care are very rare.

When a child is assigned to and placed in an Ungraded Class his care is individual and minute. Dr. Smart reexamines all classes once each term, making suggestions for further or neglected treatments and care of the health, and advising or assisting the teachers in all difficult points of hygiene and the physical care of the children. The results of these reexaminations are recorded in duplicate on forms (Form G.) which like the medical examination forms are filed, one copy in the department office, and one in the class room in charge of the child's teacher. The educational progress is recorded by the teacher four times a year and reported to Miss Farrell on the pedagogical card (Form H.) which is also filed in duplicate, so that in this manner the progress, psychical and physical, can be watched and retrogression prevented or retarded. Miss Farrell also makes regular inspections of the work and examines the progress of the children herself in addition to the report of the teacher.

It is a well known fact that the true ament is incapable of education up to the normal standard. The best that can be hoped is that they may escape in varying degrees from absolute inefficiency. Their psychic processes are at best slow, usually ineffective, and often inaccurate. Many of them can grasp, with difficulty, the concrete facts of life, but abstractions are for them in large measure, an idle and impractical dream of the optimist. Therefore their education must be essentially practical.

The psychology of the mental defective is the psychology of

Form G

## MEDICAL RE-EXAMINATION

P.S. .... Borough .....  
 ..... 19. ....

Name .....

General Condition .....

Nutrition .....

1. Motor Function .....

Tics .....

Tremors .....

Epilepsy .....

Nystagmus .....

Promptness .....

Coördination .....

Prehension, R. .... L. ....

Gait .....

Speech .....

2. Sensory Function .....

Vision, R. .... L. ....

Hearing, R. .... L. ....

3. Condition of Heart .....

Pulse .....

Throat .....

Remarks .....

.....

.....

.....

.....  
 Medical Examiner.

Form H

## PEDAGOGICAL RECORD

P. S. . . . . Borough . . . . .

. . . . . 19 . . . . . 19

Name . . . . .

Sept. 20 Dec. 20 Mar. 20 June 20 Sept. 20 Dec. 20 Mar. 20 June 20

Sense Training . . . . .							
Taste . . . . .							
Smell . . . . .							
Touch . . . . .							
Sight . . . . .							
Hearing . . . . .							
Physical Train. (imitation) . . . . .							
Physical Train. (command) . . . . .							
Writing . . . . .							
Industrial Training . . . . .							
Language (oral) . . . . .							
Language (written) . . . . .							
Reading . . . . .							
Arithmetic . . . . .							
Nature Study . . . . .							
Personal Habits . . . . .							
Self Control . . . . .							
Effort . . . . .							
Gen'l Information . . . . .							
Power of Attention . . . . .							
Power of Memory . . . . .							
Power of Judgment . . . . .							
Gen'l Health . . . . .							
Fatigue . . . . .							
Attendance . . . . .							
. . . . .							
. . . . .							
. . . . .							

Teacher . . . . .

doing, not the psychology of thinking. An ament, who, after training and practice, may tell accurately how many loads of an accustomed material he will need to haul with his own team, in order to remove a known and accustomed amount of the material, cannot be relied upon for a correct answer if the amounts are changed, and flounders hopelessly if the material is altered though the amounts remain the same. Likewise, the true mental defective, who has with difficulty and by long practice learned to weave well the paper mats of the kindergarten, must often times go through a similarly long and arduous learning process in order to weave the cane seat of a chair or a basket. That is to say, facts or muscular coördinations learned for one definite concrete purpose cannot, by any mental process of the true ament, be transferred to another purpose essentially similar; they must be relearned for the new function.

With such material the teacher of the Ungraded Class must work, and the only possible measure of success is the amount and character of the work which the defective can be taught to do with his hands in the course of one, two, or mayhap six years of individualized training. Taking into consideration the nature of the psychic processes and the requirements for life in the community which the future will demand of the ament, the subject matter included in the curriculum of the Ungraded Classes is eminently practical and aims primarily to make the defective efficient, as far as possible, in some line of industrial work. Therefore beginning with kindergarten methods and materials the Ungraded Class curriculum includes many industrial pursuits, such as mat weaving, basketry, chair caning, sewing, dressmaking, carpentry, brass-work, and the like, beside the essential reading, spelling, writing, etc., of the elementary school subjects, in so far as each pupil can be worked up to them or helped to grasp them.

The teacher who aims to be successful as a teacher of mental defectives must realize first the nature of the mental material with which she has to work, and secondly she must not be discouraged by the meagre results. As a rule among aments it is observed that their reactions to sensory stimuli are weak, lethargic, or absent. This fact is frequently due to dulled, stunted, or untrained sensory

mechanisms, not necessarily actually defective, as is true of the blind, or of the deaf, but more or less functionally atrophied from lack of exercise. In this case the teacher must first awaken the sensory mechanisms, or teach the child to feel, taste, smell, hear and see. For this purpose the teachers of the Ungraded Classes use the kindergarten methods of sense training, but use them to a degree which would be over-use for a normal child. There is little hope of making these dulled senses energetically and eagerly alert but they must be functionally active and, at least, awake.

Given the power to receive, more or less accurately and definitely, the sensory stimuli, or having been taught to receive them by the zeal and skill of a sympathetic teacher, the ament must be trained to respond. It is indisputably true that within limits the accuracy, rapidity, and delicacy of muscular coördinations are a reliable measure of mentality. The ament lacks coördination. Careful, conscientious, painstaking and persistent efforts must be made to teach the child to walk, to stand, to run, to jump, and, having mastered in some degree the coördinations of the heavy muscles and larger, fundamental groups, the coördinations of smaller muscles must be taught with the same care. This is best done: (1) by games and exercises to music—for the ament, strange to say, is fond of music and usually possesses an innate and fairly accurate sense of rhythm; (2) by simple folk dances and gymnastic drills; and (3) by manual work, with a large share of emphasis placed upon the particular form of manual training for which each child shows an aptitude or preference.

Gradually the teacher evolves and develops coördinations between sensory stimuli and their normal muscular responses and the mental defective has gained his seven league boots. With aments, as with normal beings, interest is a great incentive, and it behooves the teacher to study and cater to individual interests. However it must be remembered, else discouragement follow, that this interest, like their attention, is volatile and most difficult to hold. Interest must be constantly renewed for them by varied, vivid, and reanimating stimuli; and for this, the teacher must study the individual child. The senses and the muscles awakened to a modicum of function, the teacher must attend to the training

of the will. This is a most difficult problem, for an ament is always weak or lacking in voluntary power.

Space does not permit a discussion of methods employed, nor is there room for further outline of the individual needs of the child. New York City has adopted the "class system" rather than the "school system," primarily because it is more flexible, easily established—given children and teachers—and secondly is the method most adaptable to the general educational system of the city. The size of each class is limited to fifteen, average attendance, and a class roll of not more than twenty, in order to make possible the salient individual instruction. One or two classes—rarely more—may be established in a school under the same administrative rules as the regular classes of normal children in the same building, and the work of the whole number of ungraded classes is coördinated by the supervisory direction of the inspector of ungraded classes at the head of the special department. The term ungraded class is strictly adhered to for the purpose of avoiding all possible approbrium—the term mental defective being especially avoided—and the classes are considered as special coaching classes from which the child may be returned or promoted to the grades, if capable of being coached up to grade standards. This is necessary, because there are so many grades of amentia and some of the higher types are practically indistinguishable from the worst cases of retardation due to neglect and malnutrition.

It is obvious from a review of the foregoing facts that the teacher for mental defectives is a problem in itself. A good teacher of mental defectives can teach anything under the sun, but not every good teacher can be successful with aments. The work in New York has had one serious handicap since its organization in 1906, which has greatly retarded the rapidity of growth. It was said above that the class system was "easily established—given children and teachers." The children are in evidence in New York. Dr. Smart examined, with untiring energy and enthusiastic zeal, over 1800 new candidates last year beside reexamining the children in the classes. The teachers are not in evidence, and heretofore all searches for them have resulted only in proving that there is a great scarcity of teachers properly qualified. With the

new school year however (1909-1910), a model class was established in the Brooklyn Training School for Teachers and it is to be hoped that the enthusiasm evoked there will be highly contagious.

Special training for these teachers is essential, for their problems are most difficult and not at all identical with those of the teacher of normal children. For the help of the teachers in the system, regular conferences are held by the department and the teachers are encouraged to take University courses or those offered by the Teachers Associations or in the summer schools, from which they may derive special help. Of the University courses: Teachers College, Columbia, gives a course of one semester from the purely psychological side only; the School of Pedagogy, New York University, gives a course for two semesters from the psychological, hygienic and pathological sides. The Teachers Associations offer special work in manual training, gymnastics, etc., and courses are offered in the summer by New York University, the State Institution at Vineland, N. J., and the University of Pennsylvania. These and similar courses, which may be offered in the near future, afford opportunity to those teachers already fitted for it to gain additional and individual help, but the problem in New York has been to find the teachers already fitted. It is to be hoped that the solution is found and that other Training Schools will take up the problem and do away with the scarcity which has hampered the young and active department of ungraded classes.



# THE COURSES IN EDUCATION IN GERMAN UNIVERSITIES

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The following list of lecture courses in education and in related courses (psychology and ethics) are those actually scheduled in the universities of Germany from Easter, 1907, to Easter, 1910.<sup>1</sup> The list is published here, in part for its intrinsic interest, in part because it is so evidently symptomatic of the attitude of German scholars towards the study of education as a university subject.

Inspection of the list will show that in very few of the institutions are the lectures in education given by professors of education, but by professors of philosophy or psychology to whom the work in education has been assigned as a side issue. There is strong opposition among many university professors to the recognition of education as a separate university subject. In the official announcements the lectures in education are listed under the head of philosophy. In the courses offered by one professor there is often alternation between philosophy, ethics, psychology, and pedagogy. One notes with satisfaction this disposition to regard philosophy and psychology as necessary bases for the study of education, but one misses the practical and sociological view-points, which in the United States are also regarded as important.

There is in Germany but one practise school which actually belongs to a university department of education, although in several places the public higher schools are used for purposes of observation. That one, which is almost as well known in the United

<sup>1</sup> The material concerning the first four semesters was collected by W. Donath, a student in the University of Jena, and appeared in the magazine, *Aus dem Pädagogischen Universitäts-Seminar*, edited by Professor William Rein. The writer is under obligation both to Mr. Donath and Professor Rein for the privilege of using this material. The data for the last two semesters have been taken from the official lecture announcements issued by the several universities.

States as in Germany, is presided over by Professor William Rein of Jena. There seems to be no disposition among the universities to increase the number of these schools. When, for example, the question of extending the work in the study of education came up for consideration by the universities of Munich, Würzburg, and Erlangen less than two years ago, they not only decided against the establishment of practise schools, but they declined to appoint professors of pedagogy. At Erlangen, provision was made for the appointment of a new professor of philosophy who should have authority to give lectures on pedagogy.

Doubtless the work given in these courses is excellent, and the large number of younger men that offer them gives promise for the future; but one feels that, with a few exceptions, the study of education in German universities is somewhat disappointing, and that the universities can be only partially responsible for the development of the good teaching that has made German schools justly famous. The fact is that the teachers in the lower schools—the *Volksschule* and the *Mittelschule*—receive their training in the teachers' seminars or normal schools, and that the teachers in the higher schools have their pedagogical training in the gymnasial seminar,—the last named, by the way, an institution that may well challenge the attention of American educators who are interested in the training of teachers for the high school.

#### LIST OF COURSES<sup>2</sup>

##### BERLIN

SS '07 Psychology. *Ach* (d): Introduction to psych. (2)

Ethics. *Riehl*: Ethics I & II (1)

*Simmel* (a.p.): Ethics (2)

Pedagogy. *Münch*: Ped. theories from Schleiermacher to the present (2)

<sup>2</sup> The rank of the lecturer has been indicated as far as it was possible to determine it from the announcement. If there are no letters after his name he may be assumed to be a full professor (ordentlicher Professor); the letters (a.p.) indicate the rank of associate or assistant professor (ausserordentlicher Professor); the letter (d) indicates private lecturer (privat Dozent). SS '07 indicates summer semester, 1907; WS'07-'08, winter semester, 1907-08. Courses marked with an asterisk (\*) are supposed to have been offered in each of the six semesters.

Figures in parentheses following the courses indicate the number of hours per week devoted to the work.

- WS '07-'08 Pedagogy. *Paulsen*: Ped. and didactics (4)  
*Münch*: The educational office (2); Ped. conference\*
- SS '08 Psychology. *Paulsen*: Psych. the foundation of the spiritual sciences (4)  
*Simmel* (a.p.): Outlines of psych. (2)  
*Stumpf*: Psych. institute\*
- Ethics. *Misch* (d): The principal problems of philosophy with special reference to individual and social ethics (2)
- Pedagogy. *Münch*: Theory and art of language instruction (2)
- WS '08-'09 Psychology. *Stumpf*: Psych. with demonstrations (4)  
 Ethics. *Simmel* (a.p.): Ethics and problems in social philosophy (2)  
 Pedagogy. *Münch*: Ped. theory (2); Scientific ped. exercises (1)
- SS '09 Psychology. *Simmel* (a.p.): General psych. (2)  
*Stumpf*: Theoretical exercises in psych. institute (1);  
 Experimental exercises in psych. institute (2)  
*Vierkandt* (d): The soul life of primeval races (3); Exercises in race psych. (1½)
- Ethics. *Simmel* (a.p.): Exercises in moral science
- Pedagogy. *Münch*: Ped. theories from Plato to Rousseau (2);  
 Scientific ped. exercises (1)
- WS '09-'10 Psychology. *Stumpf*: Psych. with demonstrations (4); Theoretical exercises in psych. institute (1)  
*Stumpf* and *Rupp* (d): Psych. institute (5)  
*Dessoir* (a.p.): General psych. (2)  
*Rupp* (d): Experimental exercises in psych. institute (4)  
*Frischeisen-Köhler* (d): The psych. foundations of education (1)
- Ethics. *Vierkandt* (d): Ethics (2)  
*Simmel* (a.p.): Kant's ethics (1)  
*Groethuysen* (d): Problems of modern culture (2); The law of nature and the historical school (1)
- Pedagogy. *Münch*: The theory of instruction (2); Scientific ped. exercises (2)  
*Rupp* (d): Discussion of exper. ped. in connection with lectures (1)

BONN

- SS '07 Psychology. *Erdmann*: Psych. (4)  
*Herbertz* (d): Experimental psych. of sight-perception, especially in reading (1)
- Pedagogy. *Wentscher* (a.p.): Ped. (2)
- WS '07-'08 Psychology. *Dyroff*: Psych. (4)  
*Becher* (d): Physiological psych. (1); Feeling and will (2)
- Pedagogy. *Dyroff*: History of ped. (3)  
*Jäger*: Gymnasial ped. II (2)

- SS '08 Psychology. *Erdmann*: Psych. (4)  
 Ethics. *Becher* (d): Principal problems in ethics (2)  
 Pedagogy. *Dyroff*: Seminar in Herbart
- WS '08-'09 Psychology. *Dyroff*: Psych. (4)  
*Wentscher* (a.p.): General psych. (4)  
*Erdmann*: Exercises in the psych. of speech  
 Pedagogy. *Erdmann*: History of ped. (3)  
*Jäger*: Gymnasial ped. II (2)
- SS '09 Psychology. *Erdmann*: Psych. (4): Exper. psych., exercises in reading (1)  
*Verweyen* (d): Exercises in the psych. of thinking (1)  
 Pedagogy. *Wentscher* (a.p.): Ped. (2)
- WS '09-'10 Psychology. *Dyroff*: Psych. (4)  
*Becher* (d): The psych. of will (1)  
*Külpe*: Psych. conference (2); Exper. psych. (6)  
 Ethics. *Hammacher* (d): Exercises in Compté's sociology (1)
- BRESLAU
- SS '07 Psychology. *Stern* (d): Child psych. and pedagogy (3)
- WS '07-'08 Psychology. *Baumgartner*: Psychology (4)  
*Stern* (d): Psychology (4)
- SS '08 Psychology. *Stern* (d): Applied psychology (1)  
 Ethics. *Stern* (d): Introduction to ethics (2)  
 Pedagogy. *Stern*: (d): History of ped. to the present (2)
- WS '08-'09 Psychology. *Stern* (a.p.): Psych. (4): Exercises in child psych. and exper. ped.
- SS '09 Psychology. *Baumgartner*: Psychology (4)  
*Stern* (a.p.): Psych. of adolescence and its application to pedagogy (2); Psych. seminar (2)  
 Ethics. *Kabitz* (d): Fundamental questions of ethics (2); Exercises in Kant's ethical writings (1½)
- WS '09-'10 Psychology. *Stern* (a.p.): Psychology (4); Exercises in the psych. of adolescence in psych. seminar (1½)  
 Pedagogy. *Kabitz* (d): History of pedagogy in modern times (2); Exercises in theoretical pedagogy (1½)

## ERLANGEN

- SS '07 Psychology. *Hensel*: Psychology (4)  
 Pedagogy. *Leser* (d): Prominent educators of modern times and their phil.  
 and ped. views (2)
- WS '07-'08 Pedagogy. *Hensel*: Fichte (1)
- SS '08 Psychology. *Leser* (d): Psychology (4)  
 Ethics. *Hensel*: Ethics (2)  
 Pedagogy. *Leser* (d): Pestalozzi and Herbart (2)
- WS '08-'09 Pedagogy. *Leser* (d): Plato (2)
- SS '09 Psychology. *Hensel*: Psychology (4)  
 Pedagogy. *Leser* (d): Views of life of great educators of modern times (2)
- WS '09-'10 Pedagogy. *Leser* (a.p.): Pestalozzi and Herbart, an introd. to the  
 problems of ped. (2)

## FREIBURG

- SS '07 Psychology. *Uebinger*: Psychology (4)
- WS '07-'08 Psychology. *Cohn* (a.p.): Psychology (4)  
*Rickert*: Psych. laboratory\*  
 Ethics. *Rickert*: Ethics as social philosophy (1)
- SS '08 Psychology. *Uebinger*: Psychology (4)  
 Pedagogy. *Cohn*: Psych. pedagogy (2)
- WS '08-'09 Psychology. *Cohn*: Psychology (4)  
*Uebinger*: The phil. letters of J. E. Erdmann (1)  
 Pedagogy. *Cohn*: The ends of education and instruction (2)
- SS '09 Psychology. *Uebinger*: Psychology (4)  
*Bumke* (d): Physiological psych. (1)  
*Cohn* (a.p.): Psych. essays, by appointment  
 Pedagogy. *Uebinger*: History of pedagogy (2)
- WS '09-'10 Psychology. *Bumke* (d): Physiological psych. (1)  
*Cohn* (a.p.): Psychology, by appointment  
 Pedagogy. *Cohn* (a.p.): The higher school systems of the present (2)  
*Supple* (d): School hygiene (1)

## GIESSEN

- SS '07 Psychology. *Groos*: Psychology (4)  
 Pedagogy. *Siebeck*: Principles of didactics and theory of method in instruc-  
 tion (2)
- WS '07-'08 Psychology. *Groos*: Feeling and will in the child (1)  
*Kinkel*: The idea and the life of the human soul

- Pedagogy. *Siebeck*: History of education and pedagogy since the Middle Ages (3)
- SS '08 Pedagogy. *Groos*: Outlines of pedagogy (2)
- WS '08-'09 Psychology. *Groos*: Psychology (9)  
 Pedagogy. *Siebeck*: Outlines of didactics and methodology of instruction (2)
- SS '09 Psychology. *Messer*: (a.p.) Exercises in exper. psych.  
 Pedagogy. *Siebeck*: History of education and pedagogy since the age of Humanism (3); The nature, origin, and development of speech (2).  
*Groos*: Pestalozzi, in philosophical seminar (1)
- WS '09-'10 Psychology. *Messer* (a.p.): Psych. of will (1): Introduction to scientific works in the sphere of psych. and ped. (by appointment)
- Ethics. *Weidenbach* (d): Ethics  
 Pedagogy. *Groos*: Outlines of ped. (2)  
*Messer* (a.p.): Lectures on Natorp's social ped. (1½)

## GOETTINGEN

- SS '07 Psychology. *Goedeckemeyer*: Psychology (4)  
 Pedagogy. *Baumann*: History of ped. including curricula and lessons in the higher schools (3)
- WS '07-'08 Psychology. *Müller*: Psychology (4)
- SS '08 Psychology. *Baumann*: Outlines of ped. psych. (2)  
*Müller*: Memory and the voluntary direction of thought (4)
- WS '08-'09 Psychology. *Müller*: Psychology (4)  
 Ethics. *Husserl*: Fundamental problems in ethics (2)
- SS '09 Psychology. *Müller*: Psycho-physical method (2); Exper. psych.  
 Pedagogy. *Baumann*: History of ped. (2)
- WS '09-'10 Psychology. *Müller*: Psychology (4); Exper. psych.  
*Müller & Katz* (d): Exper. psych. (1)  
 Ethics. *Nelson* (d): Principles of ethics (4)  
 Pedagogy. *Husserl*: General history of pedagogy (2)

## GREIFSWALD

- SS '07 Psychology. *Schuppe*: Psychology (3)  
 Pedagogy. *Rehmke*: History of ped. (3); Systems of ped. (3)
- WS '07-'08 Nothing offered

SS '08 Psychology. *Rehmke*: Psychology (3); The freedom of the will (2)  
Ethics and Pedagogy. *Schuppe*: Outlines of ethics and ped. (3)

WS '08-'09 Nothing offered.

SS '09 Psychology. *Schuppe*: Psychology (3)  
*Schunkel* (a.p.): History of psych. (2)  
Pedagogy. *Rehmke*: History and systems of ped. (3)

WS '09-'10 Psychology. *Schmekel* (a.p.): Methods and results of exper. psych. (2)

#### HALLE

SS '07 Psychology. *Ebbinghaus*: Experimental psychology (2)  
*Uphues* (a.p.): General and ped. psych. (2)  
*Schwarz* (d): General psychology (1)  
Pedagogy. *Fries*: The Prussian educational system in its historical development (1)  
*Schwarz* (d): General pedagogy with reference to experimental didactics (3)

WS '07-'08 Psychology. *Busse*: Psychology (4)  
*Schwarz* (d): Introduction to exper. psych. (2)  
Pedagogy. *Fries*: History of pedagogy since the Middle Ages (2); Pedagogical exercises (1)\*

SS '08 Psychology. *Uphues* (a.p.): Psychology (4)  
*Aall* (d): Introduction to exper. psych. (2)  
Pedagogy. *Fries*: Selected chapters in general didactics (1)  
*Aall* (d): Experimental pedagogy (2)

WS '08-'09 Psychology. *Ebbinghaus*: Psychology (4)  
Pedagogy. *Fries*: History of ped. since the Middle Ages (1)  
*Schwarz* (d): Experimental pedagogy (2)

SS '09 Psychology. *Uphues*: Psychology (4)  
*Ebbinghaus*: Experimental psychology (2)  
Pedagogy. *Fries*: The Prussian educational system in its historical development (1); Ped. exercises (1)

WS '09-'10 Psychology. *Meumann*: Psychology (4)  
Pedagogy. *Meumann*: Introduction to pedagogy (2)  
*Fries*: History of ped. since the Middle Ages (2); Pedagogical exercises (1)

## HEIDELBERG

- SS '07 Pedagogy. *Uhlig*: The most important disputed questions of the present concerning the organization and administration of instruction in the higher schools (2); Extracts from the ped. writings of Herbart (1); Lectures on parts of pedagogical poems of Lucretius and Ovid (1)  
*Boeckel* (Gymnasial Director): Practical ped. Exercises (2)\*

- WS '07-'08 Psychology. *Elsenhans* (d): Psychology (4)  
 Ethics *Windelband*: Ethics (4)  
 Pedagogy. *Uhlig*: History of educ., instruction and ped. theories (2); Lectures on the pedagogical classics (1)

- SS '08 Pedagogy, *Uhlig*: The most important disputed questions of the present concerning the organization and administration of instruction in the higher schools (1)

- WS '08-'09 Pedagogy. *Uhlig*: History of educ., instruction, and ped. theories (2); Herbart's outline of ped. lectures and E. v. Sallwörk's *Normalstufen*

- SS '09 Ethics. *Troeltsch*: Ethics (5)  
 Pedagogy. *Uhlig*: The most important disputed questions of the present concerning the organization and administration of instruction in the higher schools (2)

- WS '09-'10 Pedagogy. *Uhlig*: Ped. Classics, Rousseau and Pestalozzi (1)

## JENA •

- SS '07 Ethics. *Rein*: Outlines of ethics (2)  
 Pedagogy. *Rein*: General didactics (2); Ped. seminar with practical exercises (3)

- WS '07-'08 Psychology. *Eucken*: Psychology (3)  
 Pedagogy. *Rein*: Special didactics (3); Foreign school systems (1); Ped. seminar (3)

- SS '08 Psychology. *Linke*: (d) Psychology (3)  
 Ethics. *Eucken*: Ethics (2)  
 Pedagogy. *Rein*: Special didactics (2); Life and teaching of Herbart; Ped. seminar (3)

- WS '08-'09 Psychology. *Liebmann*: Psychology (3)  
 Ethics. *Rein*: Outlines of ethics (2)  
 Pedagogy. *Rein*: General pedagogy (1); Ped. seminar (3)  
*Eucken*: History of modern pedagogy (1)



- SS '09 Psychology. *Rein*: Elements of empirical psych. (2)  
*Linke* (d): Applied psych. (2); Attention (1)  
 Pedagogy. *Rein*: General didactics (2); Ped. seminar (3)
- WS '09-'10 Psychology. *Eucken*: Psychology (2)  
*Strohmayer* (d): Neurological diagnosis, with practical  
 exercises (1); Discovery and treat-  
 ment of mental weakness in youth, for  
 physicians and teachers.
- Ethics. *Linke* (d): Principal problems of ethics and jurisprudence (2)  
 Pedagogy. *Rein*: Herbart (2); Special didactics (3); Ped. seminar (3)

KEIL

- SS '07 Ethics. *Tönnies* (d); Sociology and ethics of family life (1)  
 WS '07-'08 Psychology. *Martius*: Psychology (4); Psych. seminar (2)  
 SS '08 Nothing offered  
 WS '08-'09 Psychology. *Deussen*: Psychology and systems of phil. (4)  
 SS '09 Psychology. *Martius*: Psych. seminar (2)  
 WS '09-'10 Psychology. *Martius*: Psychology (4) Psych. seminar (2)

KOENIGSBERG

- SS '07 Psychology. *Ach*: Exper. psych. works, in seminar\*  
 Ethics. *Kowalewsky* (d): Fundamental problems in ethics (1)  
 WS '07-'08 Psychology. *Ach*: Child psych. and exper. pedagogy (1)  
 SS '08 Psychology. *Ach*: Psychology (4)  
 Pedagogy. *Walter*: History and outlines of pedagogy (4)  
 WS '08-'09 Pedagogy. *Walter*: History and outlines of pedagogy (4)  
 SS '09 Psychology. *Ach*: Introduction to exper. psych. (1½); Exper. psych.  
 (6)  
*Hallerworden* (d): Chapters in applied psych. (1)  
 Ethics. *Kowalewski* (d): Ethics (2)  
 Pedagogy. *Goedeckemeyer*: History and outlines of pedagogy (4)  
 WS '09-'10 Psychology. *Ach*: Psych. (4); Exper. psych. (by appointment)  
*Hallerworden* (d): Shakespeare's dramatic art as a sub-  
 ject for applied psych. (2)

## LEIPSIC

- SS '07 Psychology. *Wundt*: Psychology (4); Psych. Seminar  
*Wirth* (a.p.): Psych. of vision (2)

Ethics. *Barth* (a.p.): Introduction to moral philosophy (1½)

Pedagogy. *Volckelt*: History of pedagogy I, Middle Ages to Rousseau (4);  
Phil.-ped. seminar

*Jungmann*: Introduction to pedagogy (2); Practical pedagogical seminar

WS '07-'08 Psychology. *Brahn* (d): Psychology (4): Child psych. (2); Sense perception (1)

*Wundt*: Psych. seminar

Ethics. *Heinze*: Ethics and outlines of jurisprudence

Pedagogy. *Volckelt*: History of pedagogy, II, Rousseau to Herbart (3); Phil.-ped. seminar

*Jungmann*: History of higher instruction from the Reformation to the present (2); Prac.-ped. seminar.

*Barth* (a.p.): Essentials in education and the theory of instruction on the basis of the psychology of the present (2); Ped. Society

SS '08 Psychology. *Wundt*: Psychology (4): Psych. seminar

Ethics. *Richter* (d): Critical history of ethics

*Lipps* (d): Philosophical ethics (2)

Pedagogy. *Volckelt*: Pedagogy in the school of Herbart (1); Phil.-ped. seminar

*Jungmann*: Introduction to ped. (2); Practical-ped. seminar.

WS '08-'09 Psychology. *Wirth* (d): Experimental analysis of attention (2)

*Krueger* (d): Comparative psych. of primeval races

*Lipps* (d): Outlines and essentials of psych. (3)

*Wundt*: Psych. seminar

Pedagogy. *Volckelt*: General pedagogy (3); Phil.-ped. seminar

*Barth* (a.p.): History of pedagogy from the Renaissance to the Enlightenment (2); Ped. Society

*Jungmann*: History of higher education since the Reformation (2); Interpretation of Latin sources of pedagogy (1)

SS '09 Psychology. *Wundt*: Psychology (4); Psych. seminar

*Wundt*, *Wirth* (a.p.), & *Klemm* (d): Psych. laboratory (29)

*Wirth* (a.p.): Theory of psych. method (2)

*Krueger* (d); Psych. and ethics of economical living (2)

*Brahn* (d): Child psych. and exper. pedagogy (2)

Pedagogy. *Volckelt*: History of pedagogy (4); Phil.-ped. seminar, Goethe's views of life

*Jungmann*: Didactics of the higher schools (2); Practical-ped. seminar

*Rietschel*: History of pedagogy

- WS '09-'10 Psychology. *Wundt & Wirth* (a.p.): Psych. laboratory (7)  
*Wirth* (a.p.): Psychology (4)  
*Salow*(?): Introductory course in exper. psych. (2)  
*Brahn* (d): Outlines of psychology (1½)  
*Klemm* (d): History of modern psych. (2)
- Ethics. *Barth*: History and systems of ethics (2)
- Pedagogy. *Volckelt*: History of ped. from Rousseau to Herbart (3); Phil.-ped. seminar, Jean Paul's *Levana* and extracts from the writings of W. v. Humboldt  
*Barth* (a.p.): Essentials of the theory of education and instruction on the basis of modern psych. (2)  
*Jungmann* (a.p.): Introduction to pedagogy (2); Practical-ped. seminar  
*Hofmann* (Theology): Pedagogy and its history (4); Pedagogical seminar (1)  
*Lange* (Medicine): School hygiene and school disease (2)

## MARBURG

- SS '07 Psychology. *Menzner* (a.p.): Psychology (4)
- WS '07-'08 Ethics. *Menzner* (a.p.): Ethics (2)  
 Pedagogy. *Natorp*: History of pedagogy since the Renaissance (3); Phil. ped. seminar\*
- SS '08 Ethics. *Cohen*: Ethics and jurisprudence (4)
- WS '08-'09 Psychology. *Cohen*: Psych. as an encyclopedia of philosophy (4)  
 Pedagogy. *Natorp*: General pedagogy (3)
- SS '09 Psychology. *Schwarz*: Psych. of mental labor and endowment, with experiments (1)
- WS '09-'10 Psychology. *Natorp*: General psych. (3); Psych. exercises (2)  
*Schwarz*: Introduction to exper. psych. (2)  
 Pedagogy. *Natorp*: History of pedagogy since the beginning of modern times (3); Herbart's philosophy and ped. (2)

## MUNICH

- SS '07 Psychology. *Pfänder* (d): Outlines of psychology (4)  
*Schneider* (d): Empirical psychology (4)
- Ethics. *Scheler* (d): Fundamental questions in ethics (3)
- Pedagogy. *Rehm*: History of pedagogical theories from the Enlightenment to the present (4)
- WS '07-'08 Psychology. *Lipps*: Psychology (4)  
 Pedagogy. *Pfänder* (d): Outlines of the theory of education and instruction on psychological principles (4)

- SS '08 Psychology. *Schneider* (a.p.): Empirical psych. (4)  
     *v. Asler* (d): Outlines of psych. (4)  
     *Lipps*: Psych. seminar\*
- Ethics. *Lipps*: Ethics and phil. principles of the theory of law and society (4)  
 Pedagogy. *Rehm*: Theory of pedagogy and didactics for higher schools (4)  
     *Fischer* (d): Ped. exercises\*
- WS '08-'09 Psychology. *Lipps*: Psychology I (5)  
 Pedagogy. *Pfänder* (d): Outlines of the theory of education and instruction  
     on psych. principles (4)
- SS '09 Psychology. *Schneider* (a.p.): Psych. with special reference to ped.  
     questions involved (4)  
     *v. Asler* (d): Psych. (4); Psych. exercises (1)  
     *Fischer* (d): Psych. exercises (1½)  
     *Burger* (d): Art and race psych. (2)  
     *Ranke*: Anthropological psych. (4)  
 Ethics. *Geiger* (d): Introduction to ethical problems (2)  
     *Fischer* (d): Introduction to problems of sociology (3)  
 Pedagogy. *Rehm*: History of ped. theories (4)  
     *Jordan*: Fundamental questions in the method of modern lan-  
     guage instruction (1)
- WS '09-'10 Psychology. *Lipps*: General psych. (5); Psych. seminar (1½)  
     *Fischer* (d): Psych. exercises (1½)  
     *Meyer* (d): Psych. of Aristotle (1)  
 Ethics. *Scheler* (d): Fundamental problems of ethics (4)

## MÜNSTER

- SS '07 Psychology. *Meumann*: Empirical psychology (4)
- WS '07-'08 Psychology. *Geyser* (a.p.): Psychology (4)  
 Pedagogy. *Meumann*: General ped. on psych. and exper. principles (2)
- SS '08 Psychology. *Meumann*: Introduction to exper. psych. and ped. (2)
- WS '08-'09 Psychology. *Meumann*: Introduction to exper. psych. and ped. (2)  
     *Geyser* (a.p.): Psychology (4)  
 Ethics. *Koppelman* (d): The most important problems of ethics and juris-  
     prudence
- SS '09 Psychology. *Meumann*: Psych. exercises  
 Pedagogy. *Koppelman* (d): Gymnasial pedagogy and the teacher's office  
     (2)
- WS '09-'10 Psychology. *Geyser* (a.p.): Psychology (4); Discussion of psych.  
     questions (1)  
 Pedagogy. *Cauer*: Outlines and selected chapters in didactics (2)

## ROSTOCK

SS '07 Ethics. *Erhardt*: Ethics (2)

WS '07-'08 Nothing offered

SS '08 Psychology. *Erhardt*: Psychology (4)

WS '08-'09 Pedagogy. *Erhardt*: Pedagogy (2)

SS '09 Ethics. *Erhardt*: Ethics (2); Exercises in the ethics of Ed. v. Hartmann (2)

WS '09-'10 Nothing offered

## STRASSBURG

SS '07 Nothing offered

WS '07-'08 Psychology. *Baeumker*: Psychology (4)  
Ethics. *Frhr. v.d. Pfordten* (d): Ethics (2)

SS '08 Pedagogy. *Ziegler*: Pedagogy (2)

WS '08-'09 Psychology. *Ziegler*: Empirical psych. (4)  
Ethics. *Ziegler*: Ethics (2)

SS '09 Psychology. *Baeumker*: Psych. exercises (2)  
Pedagogy. *Ziegler*: History of ped. (2)

WS '09-'10 Psychology. *Baeumker*: Psychology (4); Introd. to exper. psych. (1)  
Ethics. *v.d. Pfordten* (d): Ethics (2)  
*Wundt* (d): History of Greek ethics (2)

## TÜBINGEN

SS '07 Nothing offered

WS '07-'08 Psychology. *Maier*: Psychology (4)  
Ethics. *Maier*: Ethics (4)

SS '08 Psychology. *Spitta*: General psych. (4)  
Ethics. *Adickes*: The deterministic view-point and its consequences for religion, ethics, and pedagogy. (1)

WS '08-'09 Psychology. *Adickes*: Psychology (4)  
Ethics. *Spitta*: Philosophical ethics (4)

SS '09 Psychology. *Spitta*: General psych. (4)  
Pedagogy. *Schiele* (d): Church and school in the nineteenth century

WS '09-'10 Psychology. *Maier*: Psychology (4)

Ethics. *Adickes*: Philosophical ethics and jurisprudence (4); Exercises in ethical questions (1)

WÜRZBURG

SS '07 Ethics. *Scherer* (d): Ethics (4)

Pedagogy. *Boll*: Theory and history of educ. and instruction from the eighteenth century to the present (4)

WS '07-'08 Psychology. *Scherer* (d): Psychology (4)

*Buehler* (d): Psych. of speaking and reading (2)

SS '08 Ethics. *Scherer* (d): Ethics (4)

Pedagogy. *Buehler* (d): Exper. ped. (4)

WS '08-'09 Psychology. *Külpe*: Psychology (4)

*Scherer* (d): Psychology (4)

Pedagogy. *Stölzle*: Logic and the theory of method (4)

SS '09 Psychology. *Külpe*: Psych. of thought and feeling (2); Psych. exercises (2)

*Külpe* and *Buehler* (d): Exper. psych. (5)

*Buehler* (d): Child psychology (2); Introd. to exper. psych. (2)

Ethics. *Neudecker* (d): The trend of modern ethics (2)

Pedagogy. *Stählin*: History of ped. (4)

WS '09-'10 Psychology. *Buehler* (d): Exper. psych. (2)

Pedagogy. *Buehler* (d): Exper. ped. (4)

## EDUCATIONAL PSYCHOLOGY AT THE BOSTON MEETING OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

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Readers of this JOURNAL have seen elsewhere general reports of the gathering of scientific men in Boston last December, on the occasion of the sixty-first meeting of the American Association for the Advancement of Science. Estimates of the actual number in attendance have varied somewhat widely, but the total, including those registered with the numerous affiliated organizations, was probably not far from 2000.

Educational psychology was represented upon the programs of several of these different societies. Indeed, not infrequently two or more organizations were listening at the same time to papers which were of interest to the student of this subject, and he found himself devoting much valuable time to the street-cars between Cambridge and "Tech." and the Harvard Medical School in a vain attempt to hear all that was attractive to him in the various programs. Seldom has been more clearly exemplified the increasing attention which educational psychology is receiving, and also the need for sufficient coöperation within this field to bring to a common focus these widely distributed activities.

At the opening meeting of section L, the section for Education, Professor E. L. Thorndike presented under the caption of "Units and Scales for Educational Measurement" a report upon a laborious research which is designed to perfect a scale of merit in children's hand-writing. Samples of writing were shown which had been found to represent eleven degrees of excellence, each of the equal steps in the scale being one-tenth of the difference between the

best and the poorest writing of pupils in the intermediate and grammar grades.

The discussion of Professor Thorndike's contribution was appreciative and entirely favorable until Professor Judd arose to present his paper upon The Application of the Experimental Method to Problems in Education. Professor Thorndike's scale, he said, was a scale for the measurement of a non-psychological *product*, whereas education is concerned not with the products but with the processes of mental development. Two samples of writing equal in merit as regards legibility and beauty may be products of vastly different degrees of development in motor coördination. One reason, said Professor Judd, why so much of the recent work upon mental tests has proven futile and valueless for education is found in the fact that it has been directed toward concrete products, instead of toward the ability to improve. The question is not, have these two pupils mastered the same subject-matter, but rather, how, by what methods, have these facts been achieved? For example, experiments upon the acquisition of skill have shown that acquisition with knowledge of the changes has a value which is lacking where the learner is unaware of the nature of the improvement, although the subject-matter acquired is identical in the two cases. Further experimental investigation of this and similar problems is needed.

Another pressing need according to Professor Judd is a determination, more exact than is possible with the questionnaire method, of the interests exhibited by children at different ages. It is also much to be desired that teachers shall make more experiments in teaching, *e. g.*, in making a well controlled comparison of the natural and the grammatical methods in language instruction. Much scattered investigation of this sort is being carried out, but it ought to be made more available, perhaps through a committee of section L which would serve as a clearing house for results and a center of information for prospective investigators.

At the conclusion of Professor Judd's paper, Professor Thorndike took his adversary into camp by granting all that had been said regarding the need for the study of mental processes, and then calling attention to the fact that any study of mental development



presupposes a comparison of products of some sort, which ought to be accurately measured. The attack was quickly renewed by Professor Judd, and the audience had the keen pleasure of hearing the rapid give-and-take of a brief but brilliant *Auseinandersetzung*.

In a penetrating and closely reasoned paper, Professor G. H. Mead urged the necessity for a scientific study of the social consciousness in education, for the reason that the psychology of instruction necessarily implies a social situation. The Herbartian psychology was criticised as being an association psychology which regards the child as an apperception-mass instead of a self among selves. The consciousness of self must be an integral part of instruction: the subject-matter must be brought into relation with the problems of the child and become a matter of personal import. How this is to be done is a problem which social psychology and scientific education must work out in detail.

Prof. W. F. Dearborn has been using the Dodge photographic method for the recording of eye-movements of children in the early grades, with a view to formulating a unit of measurement of progress in reading ability. He adduced highly suggestive but as yet hardly conclusive evidence to show that the number of ocular fixations in each line may be used as an index of the number of acts of attention, and consequently employed to discover, for example, whether a child really reads by word-wholes or by letters and syllables. Professor Dearborn has demonstrated that it is possible for the experimenter to obtain with practice a high degree of accuracy in counting the number of fixations by watching the reader's eye directly. The use of this simple method opens a promising field of investigation regarding the relative merits of various methods of teaching reading, the optimal size of type in first readers, and so on.

In reporting an inductive, statistical study of various Qualities of Merit in Teachers, Prof. W. C. Ruediger stated that he had found no correlation at all between general merit and health, while teaching skill and ability to keep order showed higher correlations with general merit than any other of the fourteen qualities rated. The correlation between merit and experience increases up to ten years and then declines. The best teachers in the elementary schools are found in the two lowest and highest grades.

At later sessions of section L were heard reports of "Scientific Studies of the American College," by Mr. E. C. Sage of the General Education Board and Professors Strayer and Thorndike of Columbia. Such studies as these mark the transition from the period of wholesale criticism and denunciation of the college to that of careful analysis and constructive suggestion.

Joint sessions of considerable interest were held with the Social Education Club, and with the American Psychological Association. A joint meeting with section B on The Teaching of Physics was also announced, but either because the meeting was rather late in the week or because none but the Physicists realized its importance, there were practically no members of section L present, if one makes exception of a few whose primary interest is in physics and who would have been in attendance anyway. Some of the propositions presented by Prof. E. H. Hall for discussion were purely technical, but others were of a more general and fundamental nature, and it is to be regretted that a larger number of specialists in education were not present to share in the discussion. Regarding the training of physics teachers it was maintained by Professor Hall that more thorough and specialized preparation in physics is necessary. Professor Woodhull and Professor Mann, on the other hand, contended that what is needed is a broader training. Physics teachers need a greater familiarity with related subjects so that their courses may be enriched and brought into closer contact with common life. The candidate for the master's degree should be encouraged to sacrifice some of his advanced courses in physics to make room for the study of education.

Ten papers relating to the teaching of chemistry were presented before one of the sections of the American Chemical Society. The American Nature Study Society had a very live session devoted to the content of the course in nature study, with especial reference to the need for more attention to the inorganic aspects of nature. On the programs of many of the other sections and societies were isolated contributions to the science of teaching.

In the list of papers presented before Section A—Mathematics and Astronomy—the only contribution dealing specifically with an educational theme was one in which Prof. D. E. Smith described

the work now being carried forward by the International Commission on the Teaching of Mathematics. This commission which originated at the international congress in Rome in 1908 had as its purpose the comparative examination of the methods of instruction and the courses of study in the secondary schools of the different nations; but the scope of its investigation has extended until it now includes elementary instruction on the one hand, and on the other the teaching of mathematics in colleges and technical schools, the preparation of mathematics teachers in normal schools and universities, and research methods and requirements for higher degrees. It is not the aim of the commission, said Professor Smith, to undertake any propaganda of reform or to strive to bring about international uniformity, but rather to serve as a clearing-house, to make it possible for each nation to see what the others are doing.

The American commission is composed of two hundred and seventy members, organized in fifteen committees and sixty-one sub-committees. When in the course of a few months their labors are completed the report will be a mine of information for the educator who is curious to know, for example, what aims are actually controlling the teaching of mathematics in the freshman year of our colleges, or how completely the subject matter drawn from the needs of modern daily life has replaced the obsolete business problems and the remains of the ancient theory of numbers which until a few years ago were looked upon as of paramount importance in the mathematics of the elementary schools.

The American Psychological Association was the guest of the Harvard department of psychology and held its sessions in the commodious rooms of Emerson Hall. One session was devoted to reports of investigations in the field of general experimental psychology and demonstrations of new apparatus, and one session each to theoretical psychology, abnormal psychology, animal psychology, educational psychology, and methods of teaching psychology. Only the programs of the last two mentioned have a sufficiently immediate interest to the student of education to warrant anything like a full report here; but some brief mention should be also made of the experimental contributions in animal

behavior, as illustrative of the present line of attack in this portion of the field of genetic psychology.

Three of these investigations were within the field of visual discrimination. Mr. L. W. Cole presented evidence that the raccoon, although a night-seeing animal, nevertheless possesses powers of color discrimination.

Dr. Florence Richardson has been gathering fresh facts regarding the place of vision in the life of the rat. By training rats to leap from one platform to another close by, and then varying the relative height and the distance between the platforms, it was shown that vision plays some small rôle in these coördinations, especially for purposes of orientation, but it does not make possible accurate perceptions of distance.

Prof. Yerkes described some rigorously controlled experiments now in progress in the Harvard laboratory, aimed to determine the limits of visual perception of size and form in the dog. The experiments brought out incidentally and unexpectedly some striking evidence of acute tactile discrimination, and emphasized the need for extreme caution against the possibility of introducing secondary criteria upon which judgments of comparison may be based. The dog in learning to choose the larger of two circles was held in leash each time until all was ready for the act of choice. The difference between the circles was gradually reduced and a fine degree of discriminative ability was attained. But this ability vanished when the experimenter abandoned the use of the leash! Such facts remind us that in experimenting with children and adults no less than with animals, extreme precautions are necessary to prevent the possibility of indications and suggestions given quite unconsciously by the experimenter.

It is surprising that but little study has been made of the behavior of the anthropoid apes. Mr. M. E. Haggerty made a preliminary report of some experiments upon a chimpanzee and two orang-outangs. The animals were required, as were the ones studied by Hobhouse, to secure food by using a hooked stick to draw it within reach and also by using a stick to poke the food out of a hollow pipe. The chimpanzee failed to solve the problems unaided, and was not helped by seeing the trick done by another

ape; but both the orang-outangs learned the use of the hooked stick at the first trial. One learned the second trick unaided and the other learned it after seeing it done by his mate. The results suggest to Mr. Haggerty that the apes offer a remarkably fertile field for the investigation of animal intelligence; that the sense-impulse theory of animal behavior is here inadequate; and that imitation probably plays a greater rôle than among the lower species.

While no thinker of the first rank has dared since the days of Herbart to advocate a "faculty psychology," the way of thinking which that opprobrious term represents seems to be perennially recurrent and to demand ever fresh refutation. Thus, Prof. W. D. Scott finds it necessary to remind us that there is no such thing as "general suggestibility." He measured the susceptibility of a group of students to suggestion regarding the colors of their after-images, and also regarding the threshold of warmth sensation. Many who were highly suggestible in the first test were not suggestible in the second, and *vice versa*. Indeed, the coefficient of correlation was practically zero.

Gathering her data from observation, from questionnaires and from other sources Miss Theodate L. Smith has made "A Genetic Study of the Psychology of Shame" in animals and children. Both in the individual and in the race, she concludes, the development of shame coincides with the development of self-consciousness, and reflects the social environment. Its moral quality is a late development and arises only when there is a content of consciousness which is felt to be in disharmony with, and unworthy of, the ideal self.

Three rather incomplete studies on the causes of retardation were summarized by Dr. F. Arnold. Obstructed breathing, artificially produced, decreased the efficiency of pupils as tested in memorizing, copying, doing arithmetic and making cross-marks. Defective vision seemed not to play any part in retardation. Arbitrary and artificial systems of grading which ignore individual differences operate to automatically retard those children varying much from the average.

The report of the Committee on the Teaching of Psychology

called forth words of high commendation from all sides. Prof. Whipple's portion, on the teaching of psychology in normal schools was based on a study of the conditions in nearly one-half of the normal schools in America. He pictured vividly the typical institution and then presented a long list of conclusions and specific recommendations. Miss Calkins described with much less detail the conditions in the forty-seven colleges she studied, and made a few definite suggestions.

A feature of the absorbingly interesting report read by President Sanford was a selection of quotations from letters of university teachers of psychology, revealing a striking diversity of aim and method. The general report, prepared by Professor Seashore, the chairman of the committee, was packed so full of meaty facts, sane recommendations and practical suggestions that any attempt at summary is futile. Fortunately for the immediate future of psychology in America, the Psychological Association voted to publish the report of the committee *in toto*, and consequently it will before many months be available for study by all teachers of psychology. The committee made suggestions looking toward action of the Association in bringing teachers of psychology in various sections of the country together for local conferences. It also proposed the organization of two committees, one on "the class experiment" and a second on "elementary experiments without laboratory apparatus." For some reason no steps were taken by the Association in any of these directions, and these matters must wait until the next annual meeting in Minneapolis, or be taken up through individual initiative.

Mention should here be made of an excellent paper read at another session of the Association by Professor J. P. Hylan, entitled, "An Instance of Intensive Teaching of Psychology." The methods used, and especially the order of topics employed, differed widely from those recommended in the general report of the committee.

Among the most notable features of any meeting of the A. A. S. are the addresses delivered by the retiring chairmen of the different sections and societies. At the Boston meeting four of these dealt with themes in the fields of psychology or of education.

Professor Guthe spoke before the physics section upon "Some Reforms Needed in the Teaching of Physics in our Colleges and Universities." He urged the modification of the curriculum by the addition of advanced general courses in place of some of the highly specialized courses which are at present the only ones open to prospective high-school teachers. Another needed reform lies in the direction of greater exactness and precision in the use of technical terms.

In speaking before the section of Anthropology and Psychology upon "Racial Differences in Mental Traits," Professor Woodworth contended that it is possible to account for the differences observed without assuming that they are due to differences in native ability.

In addressing the Psychological Association upon "Consciousness and Evolution," Professor Judd reminded his hearers that with the evolution of consciousness the organism becomes able, not merely to adjust itself to its environment, but also to adaptively modify the environment to itself. What this fact implies for the definition of psychology and the determination of its relations to the other sciences was illuminatingly pointed out.

An eager audience heard Professor Dewey deliver a brief address before the education section upon "Science as Method of Thinking and as Information in Education." What we want, he said, is not bits of information, but the scientific attitude. Science as method is not to be had by means of numerous short general courses in various fields of science.

Each of these presidential addresses has already been published in full in *Science* or in the *Psychological Review*.

## COMMUNICATIONS AND DISCUSSIONS

### THE DOCTRINE OF FORMAL DISCIPLINE: TWO NEGLECTED INSTANCES OF TRANSFER OF TRAINING

Recent experimental results have offered cumulative evidence that the doctrine of formal discipline, all but repudiated in this day of educational vandalism, is still good pedagogical doctrine under certain limitations. Specific training does, under certain conditions and in varying measure, insure general training. Training of one function is susceptible of transfer to another analogous function: training of one organ allows of a cross induction of effect to another corresponding organ: the effects of exercise in one member are transferred, in varying degree, to another similar member.

It is not necessary to detail the experiments here. This has been done adequately by Horne, Angell, Judd, Pillsbury, Thorndike, Bagley, Colvin, O'Shea, Heck, and others. It is sufficient to refer briefly to the experimental facts. The fact of transference has been established in operations as diverse as the following:

In spatial discrimination, transfer is possible from the finger tips of the left hand to the right, or from the third phalanx to the first phalanx (Volkmann); the practiced discrimination ability for sound intensities has been transferred to intensities of brightness, and for sorting cards to typewriter reactions (Coover and Angell). The sensitivity for tactual, gustatory, olfactory and visual stimuli can be increased by practicing with sound stimuli (Urbantschisch, Epstein); and the same holds with respect to the estimation of magnitudes and weights, perceiving parts of speech, and the marking of words (Thorndike, Woodworth, Norsworthy)<sup>1</sup>. The effects of practice in rapidity of tapping, muscular steadiness, lunging at a target with a foil, and muscular power or voluntary effort are transferred to the unpracticed hand (Scripture, Smith, Brown, Davis). Series of experiments with and without knowledge of results

<sup>1</sup> It should be stated, to avoid a wrong inference, that some of the results of these experiments are discrepant with the conclusion drawn from them in this paper.



have shown similar spreading of training in the judging of the length of lines, the perception of the Müller-Lyer illusion, and hitting a target under water, when the subjects were permitted to know the results of their practice (Judd). Similarly when the children's attention has been focalized upon neatness as an ideal of general application, neatness in geography has been found to transfer to arithmetic, grammar or history (Ruediger). Special training gives us a method of orientation or general power to meet entirely new situations more effectively (Bair), and by becoming habituated to distractions in one situation we can ignore them in others (Vogt). Finally a number of memory experiments leave us with the same conclusion. Children trained to commit poetry were able to learn selections from an historical reader with greater ease, the subject matter being quite different (Winch). Here we find transference of training at least in the field of verbal memorizing. By being trained to memorize meaningless syllables the power to immediately recall and retain numbers, letters, substantives of one syllable, Italian, prose and poetic words, visual signs, etc., has been increased from 55 to 70 per cent (Meumann, Ebert). Improvement of memory in a test series was found at times to be positively greater than in a training series where the order of four tones was memorized, as against the memorizing of the order of brightnesses, tones, and geometrical figures, the extent of arm movement, and verse (Fracker). As a further addition to this evidence I wish to direct attention to certain results in experiments with reversible perspective illusions<sup>2</sup> which bear upon the question, and which seem to have escaped the notice of reviewers.

Several years ago a half hour daily during about sixty experimental days was spent by another subject and myself in an attempt to control the reversions in a number of reversible perspective outlines, such as a parallelopiped, book, table and pyramid. Most of the figures were plane drawings, but some were tridimensional or skeleton models. It had been ascertained in prior experiments that these figures possessed a preponderant perspective (except possibly the pyramid). The practice thus consisted in the attempt to uniformly envisage the infrequent or non-predominant perspective, in all cases monocularly.

It was found that perspectivity was subject to a high degree of practice control. Arranging the total of 9246 trials into three successive time groups, the percentage of successful control amounted, respectively,

<sup>2</sup> Wallin, *Optical Illusions of Reversible Perspective*, 1905, Chapter XIII. *The relation of Practice to Reversible Perspectives*, pp. 264-286.

to 40, 62 and 82 per cent. There was an average gain of 42 per cent between the first and the last 20 days of the series. Moreover, and this is especially to the point in the present connection, it was found that the practice results had been transferred to the unpracticed eye. Occasional tests were made with the unused eye during the latter third of the series, and corresponding successes were obtained. Practice with one eye afforded practice for the other unused eye. The education of the one retina to envisage a refractory perspective constituted a cross-education of the other retina to function in the same manner. There was established a *general* disposition or tendency to meet a given situation in a given way, which was of such strength that an organ not directly exercised at all shared in the tendency. This general tendency is explicable upon the assumption that the effects of practice are *central*: the training of the one eye established certain cortical tendencies and mental attitudes. The unused retina therefore *tended* to respond in harmony with the central predisposition. At the same time, certain peripheral elements could be involved conjointly. "Thus to take only the factor of fixation: since the two eyes function as a unity, the unused eye fixated *sympathetically* with the other. Or the establishing of fixation tendencies for the used eye gave rise to a sensation series which reflexly caused the same sort of adjustment to be made by the suppressed eye when it was (later) consciously fixated upon the drawing. Even without direct stimulation by the objective rays, the covered eye was being trained; it acquired by *cross-induction* a favorable fixation *set*." But even in the latter case, the gradually acquired mode of functioning of the used eye was so *generalized* as to inaugurate similar responses in the other. There would here seem to be then a tendency of training to spread or generalize, whatever the explanation.

Another observation in connection with reversible perspectives, though less significant, also contains a pertinent suggestion. In a given series of experiments in which the figures were reversed in the direct and indirect visual fields it appeared that the reversions occurred about two and a half times faster when the figures were directly regarded instead of being seen by the peripheral retina. But after practice with certain figures it sometimes happened that the figures (the cube, pyramid and book) reversed most readily when a point outside the figures was fixated. This furnishes an instance of the transference of fixation motives attaching to the *fovea* to the *peripheral* retina. Here an acquired foveal disposition spread to the adjacent retinal elements. In other words, the foveal tendency was transmuted into a "generalized retinal habit."

These two instances of "cross-education" or transference of training have a certain value when taken in connection with the more familiar experiments which bear upon the doctrine of formal discipline. They are offered simply as furnishing evidence in favor of the doctrine, with no attempt on my part at this time to further justify, limit and explain it.

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### THE ORGANIZATION OF THE DEPARTMENT OF EDUCATION AT THE UNIVERSITY OF VERMONT

I am very glad to accept the invitation of the editor to make a statement concerning the organization of the Department of Education at the University of Vermont. Departments of education in universities are comparatively new, and in most places education courses are offered as electives on the same basis as any other subject and with the same degree of independence. A student takes a course in education just as he takes history or latin, as if it had nothing to do with his other work. He may apply some of his educational theory to his other work. But the fact that such application is the primary reason for taking the education course does not appear in any definite form, and though he may be conscious of the benefit he derives from the course, the department would be strengthened if the organization were such as to show that education is intimately related to every other subject. Even when education courses are elected, not for the purpose of teaching but for the sake of general information, culture, and breadth of view, it must be remembered that the object is to get an insight into educational tendencies which are found in other subjects. It is very desirable that college graduates who are not teachers should have made some special and systematic study of education. They are the men who are to hold positions on public school boards and on boards of trustees in colleges. Method courses are not recommended for them but the courses they do take, the history of education, the philosophy of education and school administration, must never be thought of as isolated subjects.

Except in a few institutions which have large departments of education students are not preparing to teach education itself, but they are going into elementary and secondary schools and into colleges to teach some other subjects which they study in college. The chief function

of the department of education is to strengthen them as teachers of those subjects. Having this in mind and wishing to make the department on paper represent exactly what it is doing in fact, an announcement has been made with the following as the salient points:

Students who have completed the first two years in any department of the University may enter the department of education, and when the two years of required work are completed they will receive the degree of Bachelor of Science in Education.

Any student enrolled in any department will, with the permission of the dean of the department in which he is enrolled and of the dean of the department of education, be admitted to any of the courses in education for which he is qualified, and will retain his standing in the department in which he is enrolled and be entitled to the degree to which it leads, and if he shall have satisfactorily passed the work required in the department of education he may have appended to the baccalaureate degree the words "in education."

Special students are admitted to the department subject to the same conditions that hold in other departments of the University. Education courses are also open as free electives to juniors and seniors in any department.

The requirements of the department are: psychology; principles of instruction; history of education; one other full course in education, selected after conference with the dean of the department (the courses offered are the philosophy of education, genetic psychology, school administration and secondary education); two courses in secondary methods (amounting to one semester hour); two courses in each of two subjects given in other departments; additional free electives sufficient to make a total of at least fifteen hours per week exclusive of argumentation and debate, which are required of all students in the College of Liberal Arts. A thesis is also required, treating of some subject studied in the University, from the educational point of view. This thesis must be accepted by the professor who teaches the subject and by the dean of the department of education.

Twelve short lecture courses in secondary methods are offered by members of the faculty who teach the subjects. A student must be prepared in subject matter before he enters one of these courses, and the lectures are devoted entirely to the teaching of the subject in the secondary school. Such courses are offered in Latin, Greek, French, German, English Language, English Literature, Chemistry, Physics, Botany, Zoölogy, Mathematics and History.

A candidate for the master's degree is advised to devote about one-half of his time to the subject of education and the other half to some other subject in which he wishes to specialize, and which he studies in part from the educational point of view. As a rule his thesis deals with his special subject, but he is required to discuss it in the light of educational principles.

J. F. MESSENGER.

University of Vermont.

### THE INDIANAPOLIS MEETING OF THE DEPARTMENT OF SUPERINTENDENCE, MARCH 1-3, 1910

The mid-winter meeting of the Department of Superintendence has come to be regarded as the most important educational gathering of the year. While the attendance is not so large as at the July meeting of the N. E. A., the papers and discussions are, as a rule, of a much better quality, there are fewer distractions in the way of sight-seeing and other merely recreative features incident to vacation-time, and one is likely to meet a much larger number of the real leaders in educational work.

Of late years, this mid-winter meeting has come to serve as a clearing-house between the educational theorist and specialist on the one hand and the practical schoolman on the other hand. This tendency was clearly seen in the programme at Indianapolis. The general topic for the meeting, "The Recognition of Differences among Children, and the Resulting Modifications in Education," offered an opportunity for a series of discussions that should have a basis in proved fact. The chairman of the department, Stratton D. Brooks of Boston, made good use of this opportunity. The first general session included among its speakers such men as Ayres and Witmer. The programme of the second general session included the names of A. Ross Hill and A. H. Yoder. At the third general session, papers were read by Weber of Louisiana (who is one of Witmer's pupils) and A. D. Dean of the New York State Education Department.

One of the evening sessions was given over to the discussion of four papers on school hygiene and physical education, presented by T. F. Harrington of Boston, J. H. Musser of Philadelphia, L. H. Gulick and H. H. Horne of New York.

The sectional programmes also included a number of well-known

names. Robinson of Columbia University discussed the function of history in industrial education. Sargent of Chicago presented a paper on art in its relation to industrial education. Chamberlain of California and Charles of Illinois were also speakers at sectional meetings.

Throughout the discussions and even more noticeably in the animated "shop talk" of the lobbies and corridors, there were innumerable indications of a willingness upon the part of both the specialist and the practitioner to come together in a helpful way, and to aid and seek aid in the solution of common problems. This is as it should be, and is symptomatic of a condition that augurs most hopefully for educational progress. The superintendent has often had only too good a reason to be skeptical of such "expert" advice as the specialist has had to offer. And, on his side, the specialist has had at times sufficient cause to characterize the attitude of the practitioner as ultra-conservative or even reactionary. That this unfortunate condition is passing is not only a source of gratification, but—what is far more fundamental and important—an indication that the scientific study of educational problems is at last producing results that can command the respect of the practical schoolman.

Two societies whose membership is largely represented among the readers of this JOURNAL meet annually with the Department of Superintendence. One of these is the National Society for the Study of Education. (The adjective "scientific" has been dropped from the name of this organization; whether because the word itself was too awkward, or because its implied responsibilities and limitations were too onerous, does not appear.) This Society devoted its principal meeting to the discussion of a monograph by T. D. Woods of Teachers' College,—*"Education with Reference to the Physical Well-Being of the Child."* Through some over-sight on the part of the officers, nearly one hundred members were omitted from the mailing-list and from the roll of the Society; consequently they did not receive their copies of the paper. Whether for this reason or for some other reason, the discussion of the monograph was long and heated. The contention that hygiene may be taught effectively with but a minimum of anatomy and physiology found many opponents among those present; but the difficulties and discrepancies were finally harmonized by Suzzallo of Columbia in a remarkably clear analysis of the grounds of the contention.

The National Society of College Teachers of Education opened its sessions with a banquet on the evening of February 28. The chairman

of the Society, Hanus of Harvard, presided at the banquet. He introduced as the first speaker, Judd of Chicago, who described some phases of the work that is being done in the School of Education of which he is director. Forbes of Rochester told of the results that have followed from the use of the Rochester school buildings as civic centers, maintaining that the adoption of this policy has proved itself to be by far the most important educational event in the history of the city. Sargent of Chicago outlined some investigations that he has made in the field of industrial education. As a result of these investigations, Sargent believes that the assumption, now generally accepted, denying an educative influence to processes or exercises that have reached the plane of habit or automatic skill must be revised and perhaps reversed. Buchner of Johns Hopkins, Gore of Chicago, and Bolton of Iowa (the retiring secretary of the Society) were also among the speakers of the evening. It is rather unfortunate that the banquet was held on the evening devoted to the first session of the National Society for the Study of Education. The latter organization is the older and may justly be accorded precedence in a conflict of this type.

The Tuesday and Thursday sessions of the college teachers were given over to the discussion of the monograph prepared by Superintendent Spaulding of Newton, Massachusetts, "The Aim, Scope, and Methods of a University Course in Public School Administration." (This paper and the accompanying discussions will be reviewed in an early number of the JOURNAL.) Although the published paper had been in the hands of the members for several days, a large part of it was read at the first session by the author. When this reading was completed, the speaker attempted to answer the criticisms to which his paper had been subjected by Burris of Cincinnati and Elliott of Wisconsin,—especially by the former. Unfortunately this phase of the discussion became personal, and, together with Burris's rejoinder, gave one the impression of a petty type of acrimonious debate which seemed quite out of harmony both with the purpose of the Society and with the serious import of the subject under consideration.

The general discussion that followed this unfortunate incident was opened by De Garmo of Cornell who asked for light upon the important question, What are the fundamental sciences that should underlie a course in school administration? This question furnished a point of departure for the subsequent speakers. Johnston of Michigan joined with Burris in advocating an ethical basis. Deahl of West Virginia indorsed Spaulding's contention that the principle of universal education formed

an adequate basis. Suzzallo maintained that the school must deal with the individual pupil on the one hand, and, on the other hand must adjust itself to social conditions. It is the latter phase of the school's function that becomes the unique field of school administration and for this reason the sciences that are fundamental to school administration are sociology and political science. Yocum of Pennsylvania, Buchner of Johns Hopkins, Withers of St. Louis, and Butler of Chicago also participated in the discussion on Tuesday.

Thursday's meeting opened with the business session. Judd of Chicago was elected chairman for the ensuing year, and Holland of Indiana, secretary. The Society has hitherto printed its own proceedings, but an arrangement will be made with the University of Chicago Press for the publication of future volumes. The excellent financial condition of the Society is due entirely to the efforts of the retiring secretary-treasurer, Bolton of Iowa; and this fact was fittingly recognized by a vote of the Society.

The discussions of this session were opened by Hollister of Illinois, who emphasized the necessity for a sharp distinction between administration and supervision. Rankin of Minnesota contended that the problems of teaching administration in the state universities were somewhat different from the problems in the large endowed universities because of the more intimate relations which the former institutions sustain to the public-school system. Strayer of Columbia, Foster of Kansas, Meriam of Missouri, and Sutton of Texas continued the discussion, which was brought to a close by the chairman.

It is difficult to state the net results of this meeting,—still more difficult to evaluate them. Perhaps one noted most frequently the lack of definiteness in the discussions. If a meeting of this sort is to be valuable to those who attend and participate, it must concern itself, in part at least, with an interchange of experience. What one does to solve the problems,—the actual adjustments that one makes,—these are vastly more interesting and helpful than a discussion of one's philosophical bias. This is not to say that one's philosophical bias is unimportant: on the contrary, it is fundamental—to one's self. And, in order that we may know a speaker's fundamental attitude, some reference to basic principles is both inevitable and appropriate. But, after all, where help can be given most effectively and abundantly is in a much narrower sphere. Men who have reached the age of the average college teacher of education have their philosophical and ethical theories pretty thoroughly crystallized, and two three-hour sessions are not likely signifi-



cantly to modify these systems. But the mere hint of a practical method of approach, the suggestion of an effective scheme for organizing one's materials, the description of ways in which students may become interested in what we have to teach, or be led to see the significance of our work:—these are the results of this annual interchange of experience which will be of the greatest service. True, the outsider may consider these matters trivial and unimportant; but that does not matter much.

W. C. B.

## NOTES AND NEWS

At the annual meeting of the American Psychological Association which was held in Boston, December 20 to 31, Prof. W. B. Pillsbury of the University of Michigan was elected President, and Prof. A. H. Pierce of Smith College was reelected Secretary and Treasurer. The next meeting of the Association will be held in Minneapolis in conjunction with the American Association for the Advancement of Science. For the convenience of those who are unable to attend this meeting it is proposed to hold a section meeting in connection with the meeting of the American Philosophical Association at Princeton.

At the fifth annual meeting of the Southern Society for Philosophy and Psychology, held at Charlotte, N. C., December 28, 1909, the following officers for the year were elected: *President*, Edward Franklin Buchner, Johns Hopkins University; *Vice-President*, Shepherd Ivory Franz, George Washington University; *Secretary-treasurer*, Robert Morris Ogden, University of Tennessee. A. Caswell Ellis, University of Texas, and David Spence Hill, Peabody College for Teachers were elected members of the council to serve two years, and Bruce R. Payne, University of Virginia, and Haywood J. Pearce, Brenau College, to serve three years.

The fourth Congress for Experimental Psychology will meet at Innsbruck on April 19, 1910.

At the request of the Belgian government Dr. Elmer Ellsworth Brown, United States Commissioner of Education, has appointed the following committee to have charge of American interests at the Third International Congress of Home Education, Brussels, 1910: Prof. M. V. O'Shea, University of Wisconsin, Chairman; Prof. W. C. Bagley, University of Illinois, Secretary; President Wm. L. Bryan, University of Indiana; Mr. Wm. H. Allen, Expert for the Sage Foundation, New York; Prof. Irving Fisher, Yale University; Chairman of the Committee of One Hundred; Judge Ben B. Lindsey, Denver; Dr. D. P. MacMillan, Child-Study Expert, Board of Education, Chicago; Superintendent Frank B.

Cooper, Seattle; Mary E. Ahern, Editor Public Libraries, Chicago; President E. B. Johnstone, Vineland, N. J.; Lewis H. Jones, State Normal College, Ypsilanti, Mich.; Charlotte Perkins Gilman, Editor, New York; Mrs. H. K. Schoff, President of the National Congress of Mothers, Philadelphia; Dean W. S. Sutton, University of Texas; Prof. Henry Suzzalo, Columbia University; Bertha Payne Miller, University of Chicago.

The council of the American Physical Education Association, at its annual meeting in Philadelphia, January 1, elected the following officers: *President*, Dr. George L. Meylan, Columbia University; *Secretary-Editor-Treasurer*, Dr. J. H. McCurdy, International Y. M. C. A. Training School, Springfield, Mass.

According to *Science* a joint committee of the Mathematical Association, London, and the Association of Public School Science Masters has been considering the possibility of correlating the teaching of mathematics and science, and has prepared a report on the subject.

Dr. Edmund Clark Sanford was installed as President of Clark College on February 1.

On Thursday, February 3, Prof. Roswell P. Angier of the Yale Psychological Laboratory delivered a lecture before the Columbia Psychological Club on "Freud's Interpretation of Dreams."

On January 11 Dr. E. L. Thorndike, professor of educational psychology in Teachers College, Columbia University, gave an address before the Middletown Scientific Association on "Experimental Studies in Animal Intelligence."—*Science*.

We read in *Science* that Dr. Karl Groos, professor of philosophy and pedagogy at Giessen, well known for his works on the "Play of Animals," and the "Play of Man," as well as for his more recent book, *Das Seelenleben des Kindes*, has resigned his chair at the university.

The branch secretaries of the (English) Child Study Society are distributing in London and in other large centers a schedule prepared by Prof. Karl Pearson, F. R. S., for studying the factors influencing the social life of the child, which it is desired shall be filled in by heads of

families or by teachers intimate with families. As an appeal is made to secure an adequate number of returns, we assume that American readers who are interested may obtain blanks by applying to the Secretary of the Child Study Society, 90 Buckingham Palace Road, London S. W.

We learn from the *Educational Times* (London) that at the opening of the new Carnegie Physics Laboratory at University College, Dundee, Sir J. J. Thomson surprised some of his hearers with this paradoxical assertion. "It may seem a strange thing to say, but I think that, for educational purposes, a bad teacher is better than a good one." Your good teacher, he argued, is too clear; your admirable text-book leaves no difficulties to puzzle over. So the student does not reap the old intellectual training of puzzlement. If this statement be interpreted literally, we are inclined to feel, with the *Times*, that "there are risks in paradoxical expression." It is unusual, to say the least, to endorse formal discipline in this guise.

Dr. E. C. Moore, of our board of collaborators, has resigned the superintendency of schools at Los Angeles to accept the newly established professorship of education at Yale University.

Mr. J. O. Engleman has been placed in charge of the department of psychology and education in the newly established state normal school at La Crosse Wis. Mr. Engleman was formerly principal of the training school of the Indiana State Normal School.

Mr. W. H. Sanders, formerly superintendent of the city schools of Bloomington, Ind., is in charge of the training department in the La Crosse Normal School.

Mr. Daniel Starch is conducting the courses in educational psychology in the University of Wisconsin this year. Professor W. F. Dearborn, formerly in charge of these courses, is now in the School of Education at the University of Chicago.

Prof. E. B. Titchener has been appointed research professor in the reorganized Graduate School of Cornell University. Professor Titchener will henceforth give no instruction to undergraduates, but will confine his attention entirely to research work.

Dr. A. H. Sutherland, formerly assistant to Dr. S. I. Franz of the Government Hospital for the Insane, Washington, D. C., has been appointed instructor in psychology in the University of Illinois.

It is announced in *Science* that Professor Jacques Loeb, of the University of California, known to readers of this Journal for his work in comparative psychology, has been appointed head of a newly organized department of experimental biology in the Rockefeller Institute for Medical Research. Professor Loeb will take up his duties at the Institute next autumn.

Dr. Shepherd Ivory Franz, psychologist at the Government Hospital for the Insane, Washington, D. C., has been appointed scientific director of that institution.--*Science*.

The teachers of educational psychology in New York State will meet at Ithaca, April 8th and 9th, at the invitation of the Educational Department of Cornell University, to discuss problems arising in the teaching of this subject, and to effect permanent organization.

The Western Philosophical Association and the North Central Branch of the American Psychological Association will meet at the University of Iowa, March 25th and 26th. The two associations will run separate programs, except for one or two joint sessions. These meetings will be preceded by a session of the association of the teachers of psychology in Iowa.

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Peter Sanderson

## THE RÔLE OF THE TEACHER IN THE MOST EXPEDITIOUS AND ECONOMIC LEARNING

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The material presented in this paper consists, in the main, of facts revealed by a study of learning which the writer has been pursuing for the past five years (1, pp. 1-188). From this and other recent studies of acquisition will be selected such facts as emphasize the importance of the teacher's work and show most clearly the specific rôle played by the teacher in learning.

Psycho-physically speaking, learning and the acquisition of skill consist in the formation and development of a group or groups of special associations. Recent studies of learning have described the specific habits formed in certain special kinds of learning (8, pp. 353-358). Much, also, has been determined about the way in which these special associations are formed and developed in the process of learning (3, pp. 28-35; 4, pp. 355-375; 6, pp. 287-305; 1, pp. 23-99), and many of the factors and phenomena have been described which help or hinder the development and growth of the associations to be formed. What do these studies tell us about the rôle of the teacher in economic learning?

It has been found, for example, that in learning typewriting, two groups of habits are formed (1, pp. 23-75): (a) habits of manipulation, a complicated hierarchy of psycho-physical habits having to do with the writing as such, and (b) habits of control, a group of more general habits acquired in the course of the learning, well characterized by the phrase, "learning to learn." In the development of this second group of habits, which includes such specific acquisitions as learning to develop most economically the special writing habits to be formed (1, pp. 68-75), learning how to meet more successfully the many special difficulties

encountered in the learning, how to economize and apply one's attention and energies, learning to keep the mind properly focused on the work, learning to acquire and maintain the most helpful feeling tone, *et cetera*,—the teacher can be of little service except in helping the student to overcome the many special difficulties encountered in the learning. He can not make the learners always have the right attitude towards the work; he can not show them how to apply their attention and energies in the most economic way; he cannot teach them to see more readily the adaptations which will give the better mastery over the task; but if he knows the specific difficulties which the learner encounters and at what stages of advancement they occur, and realizes that they *must* be promptly dealt with and overcome, if the learning is to be economic, he may be of much assistance to the learner even in the acquisition of these habits of control. The student learns, if he succeeds, that every difficulty must be squarely met and mastered before complete success can be attained, but the lesson usually comes hard. The right sort of direction and help from a skilled teacher would save much time and energy because the teacher will insist that all difficulties are squarely met and promptly overcome as they appear, and by skillful direction will prevent many of the difficulties generally encountered in the learning.

The number and kinds of errors made by the learners of type-writing, as interpreted and explained by their introspective notes, revealed the fact that many hindering associations were developed in all stages of the learning. That is to say mental and physical tendencies were formed in every stage of advancement which greatly interfered with the development and exercise of the habits to be formed. At certain definite stages of advancement these interferences became so numerous and troublesome that the learners had to give almost their entire thought and attention to avoiding and overcoming them. One illustration will indicate the importance of making the right adjustment to this type of difficulty.

Four and a half months after the regular practice of the learners ceased, one of the regular subjects was given ten writing tests under the same laboratory conditions that governed the regu-



lar practice. Every precaution was taken to keep conditions uniform. A year and a half after the regular practice ceased, and a year after the first memory tests, another series of ten tests was given with the same precautions as before. The score for the first memory tests was slightly lower than for the last ten tests of the regular practice (1, pp. 75-84). But the second memory tests, taken after a rest interval of a year and a half, during which time a typewriter was not even seen, showed an average daily gain (deducting all errors) of eighty-five strokes. Similar gains during long periods of no practice or study have been noted by other investigators in different fields of acquisition (2, pp. 327-340; 10, pp. 131-133), the increase in skill indicated by such gains being generally assumed to be due to some sort of neural growth (5, pp. 126-131; 6, p. 297), if any explanation is offered. Swift does not attempt to explain his results.

By processes too detailed to be described here it was determined that the gain shown by our memory tests was due not to some form of neural growth but to the disappearance, with the lapse of time, of numerous psycho-physical difficulties, interfering associations formed in the process of learning, which, as they faded, left the more firmly established typewriting associations free to act. It was determined that such hindering associations were formed in all stages of the learning, at certain definite stages of advancement in masses, and that after the rest interval of a year and a half they had noticeably disappeared, as witnessed by the fact that the associations involved in the writing now worked more smoothly and easily than ever before.

The significance of these interferences for learning, and the importance of overcoming this type of difficulty now becomes clear. In the process of learning typewriting, the development of many conflicting associations is a natural but more or less unnecessary accompaniment of the development of the associations to be formed. With expert direction from a skilled teacher these mental interferences may be kept to a minimum. Without such help and direction the learner pushes himself into all sorts of blunders and mistakes, most of which never make any objective manifestation of themselves. These must be carefully avoided and elim-

inated before future progress is possible. It was clearly determined that the final perfection of the elemental associations involved in learning typewriting occasioned difficulties which gave opportunity for the formation of many interferences, causing much loss of time and energy. Other investigators have described different aspects of the same type of difficulty. Cleveland observed that his subjects, at certain stages of learning to play chess, could not play in proportion to their knowledge of the game (6, p. 298). Swift noticed that, at certain stages in the learning of a new language, new factors accumulated too rapidly for immediate assimilation. He thought that the plateaus in the learning curves represented, among other things, "the minds revolt against further crowding and cramming" (9, p. 311). Our study of typewriting showed that our learners naturally tended to push themselves along too fast at the critical stages in the learning, giving opportunity for the development of masses of interferences. It is the privilege of the teacher, who should know how the subject is learned by the student, so to guide and direct the learners that a minimum of these interferences will be formed. By carefully directing the activities of his students in advance, he not only prevents the formation of many hindering associations but makes sure of the perfection of the elemental habits that must be formed before the highest levels of success can be attained.

The teacher should also know the most favorable periods for work and rest in a given field. Our study showed that practice when the learners were nervous or tired was not only worthless so far as strengthening old associations was concerned, but was positively injurious because it made conditions favorable for forming wrong habits of mind and hand. The best results for learning can only be obtained when the periods of practice or study are, on the one hand, of such length as will give the greatest amount of practice to the habits to be formed with the least opportunity for developing interferences, and when the intervals between the practice or study periods are, on the other hand, of such length as will insure the most complete dropping out of the interfering tendencies naturally formed in the course of the learning, with the least possible fading on the part of the associations to be established. Fur-

ther investigation must determine what the most economic periods of work and rest in the different fields of learning are. It will be the privilege of the teacher, when this shall have been done, to make the right adjustment here as well as so to guide and direct his students that a minimum of interferences will be formed.

The rôle played by the teacher in economic learning will be seen to be more important still when it has been pointed out how the first group of habits mentioned above (habits of manipulation) was formed and developed. It was determined that these type-writing habits were developed in a particular manner. The earliest associations used in the writing were adapted from the masses of familiar associations and activities (mental and physical) which the learners brought with them, ready formed, to the task. In the beginning the learners' attention and energies could not be applied to the writing in a direct and economic way. Under the influence of the strong desire to succeed there were called up masses of old and familiar associations or forms of activity, most of which were not directly serviceable. From these old associations and excessive activities there were formed, by the double process of selection and elimination, the first laborious methods of writing. By the elimination of certain details, and the simultaneous reorganization of others, into more economic methods of dealing with the problem of writing—a process called forth by the extreme exertions of the learners in their desire for greater efficiency and speed—these first circuitous methods of writing were simplified, refined, and changed, until, sheared of their accessories, they formed the first direct (letter) associations used in the writing. These letter associations were in turn short-circuited and reorganized, as the practice continued, into more economical habits of writing, of which new groupings they became the elemental parts, and into which their identity was gradually merged while these higher (word) habits were in turn worked over into yet higher complexes by processes similar to those operative in their own formation. Throughout this process of developing higher-order habits a sort of unconscious struggle for existence occurred among the many activities and modes of work called forth, resulting in the survival of those methods of work which proved themselves, under the

circumstances, the most efficient. Many of the associations and activities called up existed but to be eliminated, others were selected and progressively organized into the higher-order habits of the hierarchy.

Two important facts were determined about this inventional side of the learning. It was found that the new adaptations or forward steps in the development of these higher-order habits were never planned but made quite unintentionally so far as the learners were concerned. The new and better ways of writing were simply fallen into when the conditions for learning were favorable and when the learners were working under strain. It was observed that they were regularly executed marginally for a time before the learners became aware of their presence or value for the work. It would, therefore, seem that the teacher could be of little service to the learner in the development of higher-order habits. He can not direct the selections to be made, neither can he make the learner choose the better way when the opportunity is presented.

A second fact was determined, however, which shows that the teacher plays a most important rôle even in this inventional part of the learning. In their study of telegraphy Bryan and Harter found that years of daily practice in receiving messages at ordinary rates would not bring a man to his maximum ability to receive, while men whose receiving curve had been upon a level for years frequently acquired the ability to receive at a much faster rate when forced to do so in order to secure or hold a position requiring the greater skill. They decided that it took "intense effort to educate" and believed that "one reason why sixty-five per cent of those who begin to study telegraphy get discouraged and quit when they reach the first plateau is that they do not make the painful effort necessary to become experts (3, p. 51).

Our study of typewriting verified this result. It showed that the necessary pre-condition for taking the above named forward steps in the learning was *extreme* effort, carefully applied to the details of the work on a good day, after all old associations had been carefully revived and a favorable writing psychosis devel-

oped (1, pp. 92-95). It was further determined that less effort was actually put into the work, by the learners at all those stages of practice where little or no progress was made, than at the stages where improvement was steady and rapid (1, pp. 140-147). Moreover, the particular rôle which effort played was clearly revealed. Relaxation of attention or effort not only kept the learners from using the most economic methods of writing, lately acquired, it kept them from making new adaptations. When attention was relaxed they were forced to do the writing in a more primitive and automatic way. That is to say with relaxed attention they could not hold themselves on the frontier of their achievement where new adaptations in method might be laid hold of.

It was further determined that the simpler ways of writing used by the learners (lower-order habits) tended strongly to persist long after they had been superseded by more economic methods of writing. The law of habit plays a double rôle in learning. The associations used in the early writing offer a certain resistance to the new ways of writing which are being or may be developed. They strongly tend to persist long after more economic habits have been developed, a tendency which requires constant effort to overcome. At every lapse in attention or relaxation of effort the old habits stepped forward, as it were, and assumed control. The tendency to continue the work on the plane of efficiency already attained is constantly present. In learning typewriting it was only when the learners were urging themselves forward so fast that the outgrown habits could not be used, that more economic methods of work were developed. All elementary habits must be mastered and carefully perfected, to be sure. By no device may this be slighted or omitted. But a matter of as much importance for progress in learning as the perfection of elemental habits, is their progressive organization into better methods of work. They must as rapidly as possible be superseded by higher-order habits if the learning be not arrested.

It should also be pointed out that leaving the old habits behind and forming higher-order habits out of outgrown elemental ones is a process which becomes progressively more difficult as advance-

ment proceeds. Most learners are masters of nothing, and therefore have had little or no experience in learning beyond beginning stages where progress is easy and rapid. In the advanced stages new adaptations become harder and harder to make, increasing the tendency to continue the work in old habitual ways. The learner, therefore, has special need for the assistance of a skilled teacher in this inventional part of the learning, (1) to see that important details are thoroughly learned, (2) to provide every possible stimulus to effort when the conditions are favorable for developing better methods of work.

The specific rôle to be played by the teacher in economic learning is made still more concrete by the fact that an actual relearning was found to occur each day. It was determined that old and newly formed associations would not work as easily and readily upon first beginning to write as later in a test (1, pp. 103-109). A little time was required at the beginning of each test for reviving old associations and for developing a favorable set of mind (type-writing psychosis). It was found that on an off day and during the early part of a test a learner could not work to advantage with a "do-or-die" attitude, as our learners sooner or later found out for themselves. It was impossible for them to make new adaptations before the older associations had been fully revived. It was strenuous effort carefully applied to the details of the work when all conditions were favorable and when the learners were thoroughly warmed up and had the right psychosis for making adaptations, that lifted them out of habitual methods of writing onto higher planes of work. A skillful teacher will, therefore, not try to crowd his pupils at the beginning of a lesson but will see that old associations are carefully revived, by slow practice, discussion, and reviews. He will not try to force his learners on the bad days, when they are "all out of sorts," or before they are warmed up, but will see to it that maximum effort is applied when the conditions *are* favorable for making a jump. It is a part of the teacher's business to keep conditions as favorable as possible for learning and to provide suitable stimuli when increased effort will result in gain.

But while the teacher can be of much assistance in the matter of

*developing* these typewriting habits, as we have seen, his chief function in economic learning will not appear until it has been pointed out how these habits of manipulation are naturally perfected. As previously stated the necessary pre-condition for developing a hierarchy of habits, such as must be acquired in all complex forms of learning, like typewriting, is the gradual and complete perfection of the elemental associations which combine to form the higher-order habits of the series. By no device can this be omitted. The manner of their growth and final perfection, therefore, becomes a matter of first importance.

It was once thought that the logical method of learning was also the natural or psychological method, that the most economical way of learning a language, for example, was first to learn the letters perfectly, then combine them into syllables, learning words by combining syllables, sentences by combining well known words, and thoughts by combining sentences etc. Studies of learning have shown, however, that in natural learning associations do not so develop (9, pp. 304-305; 8, p. 355; 11, p. 295). It has been determined, that, while the special habits formed, do appear in a definite order of succession, none of the elementary habits reach complete maturity before the next higher-order habits become possible. On the contrary the various associations to be formed naturally develop together and before any of the special habits have become fully perfected, the next higher order habits are already well along in the process of their development, and operative in the work.

Bryan and Harter found, for example, that practice in receiving telegraphic messages in sentence form increased their learners' ability to take isolated letters and words. They also found that more mistakes were made in receiving disconnected letters than in receiving, at a much more rapid rate, letters forming words, more mistakes made in receiving disconnected words than in receiving, at a still higher rate, connected discourse, showing that the development and mastery of higher-order habits "lead to greater accuracy in detail," by helping perfect the elemental habits involved (4, p. 358). Later studies have more conclusively shown

that in natural learning elemental habits are not finally perfected *before* the higher-order habits begin to form but that the development of the higher and perfection of the lower goes hand in hand throughout the learning, that the lower-order habits are perfected in and through the formation of the higher even as the further development of the higher is dependent upon the perfection of the lower (1, pp. 85-90). They have shown that the natural and most economic method of acquiring habits is to let them thus grow and develop together. The natural and most economic method of learning demands that we practice with the highest-order habits possible, thus learning all the units in their proper setting (4, p. 368). The role of the teacher in this part of the learning would, therefore, consist in seeing that this natural, and economical method of learning be followed instead of some artificial, logical method.

But even when this psychological method of learning is followed the final perfection of the elemental habits presents a peculiar difficulty hard to overcome successfully. The epoch making study of Bryan and Harter showed that at certain stages of learning telegraphy the practice of their learners did not result in the usual advancement. There were long stretches in the practice where no appreciable improvement was made, periods of work marked by plateaus in the learning curves. After much painstaking investigation Bryan and Harter decided that these periods of arrest were a very important and necessary part of the learning process, representing a condition brought about quite naturally and generally by the way in which a hierarchy of habits was developed (4, pp. 356-358). Later studies have confirmed the existence and emphasized the importance of these periods of arrest (1, pp. 18-21, 140-148). In his latest study of learning Swift writes: "By far the greater part of the learning period is spent on plateaus, when both teacher and pupil, failing to understand the situation, feel that they are marking time" (9, p. 310).

The careful analysis of the learning consciousness obtained from our learners for all stages of learning typewriting, verified by objective records of their writing and complete records of their working



pulse, showed that the plateaus in these curves were caused, not by the order in which the typewriting habits developed, but by the learners' failure to overcome certain specific difficulties encountered at those stages of advancement where certain elemental habits or groups of such habits were being finally perfected (1, pp. 85-90, 140-148, 156-157). It was determined that all special associations formed in learning typewriting were finally perfected very gradually and slowly (1, pp. 98-99). They required a minimum of oversight for a very long time after they seemed to be entirely self regulative. It was also determined that as consciousness was gradually relieved of the oversight of details by the automatization of the associations forming, attention tended naturally and strongly to slight the details of the work and to wander away from the writing as a whole, busying itself with the irrelevant images which at these stages swarmed in the fringes of consciousness. At these critical stages in the learning one of three things normally happens.

First, the learner may be caught more or less unawares by this lapse in spontaneous attention and effort and continue to work as carefully as usual but more and more halfheartedly until a habit of working lazily is formed. He is caught unawares by the law of habit and continues using lower-order habits when he should be forging ahead making new adaptations. There will be a further perfection of the habits already developed provided mistakes are avoided; but since elemental habits can best be perfected in and through the development of the higher-order habits, even this will be slower. No genuine progress in learning can occur unless new adaptations are made.

Second, there is more apt to go with the lapse in attention and effort a growing carelessness and general indifference towards the work, which, when the lack of progress brings a spur to effort, results in a careless misapplication of attention and effort. The learner assumes a freedom which he does not possess and pushes on to the development of higher-order habits *before* the elemental associations have been sufficiently perfected for this to be safely done. The slight conscious direction needed for so long a time to perfect elemental habits is neglected, and practice in error and

arrest of learning result, because all interferences so occasioned, must be overcome before further progress in learning can be made.

Third, the learner may, however, so successfully deal with the natural lapses in attention which occur at the critical stages in the learning, conquering every tendency to lag by the application of well directed effort, that progress will be continuous, and all plateaus eliminated from his learning curve.

All plateaus in our learning curves were caused by the failure described in the first or second alternative or by both acting together (1, pp. 161-166). The third alternative was also represented in our experiments, one or more plateaus being eliminated from the learning curves by the successful mastery of the difficulties encountered at the corresponding critical stages. But it should be pointed out that the critical stages present difficulties, which the average learner, who does not know the cause of the trouble, finds very hard to overcome. The learner, if left to himself, rarely if ever solves the problems presented in the most economic way. He will rarely or never be able to meet successfully the more serious critical stages. He cannot of himself make amends for the natural lapses in spontaneous attention, because the most effective incentives to effort, those born of progress and success, are lacking. He cannot make up the deficiency by a sheer act of will. He may try as hard as he may, his energy mainly goes into the trying instead of into work activities. Artificial stimuli must be supplied from without, by grim necessity, some future interest or end, etc. The learner, at these critical stages, has special need for the help of a skilled teacher, (1) to see that he attends to the necessary details until they are thoroughly learned, (2) to provide such incentives to effort, emotional helps, and interest in the higher phases of the work as may fully atone for the lapses in attention which the final perfection of the elemental habits naturally brings on.

A skillful teacher may also do much by way of inducing in his learners a helpful feeling tone. It was determined that in learning typewriting a pleasant feeling tone and an attitude of interest always accompanied the periods when the work was done well or

when progress was rapid. A distinctly unpleasant feeling and an attitude of indifference always accompanied the periods of practice where the work did not go well, and the stages in the learning where little or no improvement was made. It was also determined that the pleasant feeling had a helpful reactionary effect on the work, the unpleasant feeling a restraining, hampering effect. In fact so close was the correlation that one might have judged the learner's degree of success from his general feeling tone. It was also determined that the development of the attitude characteristic of the expert typist was one of the important acquisitions in the learning. In the early stages of learning our subjects were all very much interested in the work. Their whole mind seemed to be spontaneously held by the writing. They were always anxious to take up the work anew each day. Their general attitude and the resultant sensations, constituted a pleasant feeling tone, which had a helpful reactionary effect on the work. Continued practice, however, brought a change. In place of the spontaneous, rapt attention of the beginning stages, attention tended, at certain definite stages of advancement, to wander away from the work. A general feeling of monotony, which at times assumed the form of utter disgust, took the place of the former pleasant sensations and feelings. The writing became a disagreeable task. The unpleasant feelings now present in consciousness exerted an ever restraining effect on the work. As an expert skill was approached, however, the learner's attitude and mood changed again. They again took a keen interest in the work. Their whole feeling tone once more became favorable and the movements delightful and pleasant. The expert typist, who served as subject in our experiments, so thoroughly enjoyed the writing that it was as pleasant as the spontaneous play activities of a child. But in the course of developing this permanent interest in the work there were many periods in nearly every test, many days, as well as stages in the practice as a whole when the work was much disliked, periods when the learning assumed the role of a very monotonous task. Our records showed that at such times as these no progress was made. Rapid progress in learning typewriting was only made when the learners were feeling good and had an attitude of interest

towards the work. It is the privilege of the teacher when such lapses in interest occur, to give such encouragement as will change, at least in part, the learner's general feeling tone.<sup>1</sup>

#### SUMMARY

The studies of learning thus far made are few in number and somewhat varied in method but they, nevertheless, show that the teacher plays a very specific and important role in all acquisition. The specific kind of help to be given may be summarily stated as follows:

1. It is the teacher's business to see that the particular types of difficulties encountered in learning are properly dealt with and promptly overcome as they appear. To do this in the most helpful way the teacher must know the specific difficulties which his learners encounter, at what stages of advancement they occur, the

<sup>1</sup> There will, of course, be idlers in the pedagogical market place ready to say, nothing new here! We have known all this before. It is but another way of saying that the teacher must know the child and the subject he is to teach. For if he understands his subject, he will know how it is learned, where the critical stages in the learning appear, how to direct his students so that the learning may be made continuous and economic. If he understands his pupils as he should he will know how to give the required encouragement. We have known it all before. Of what use is Experimental Pedagogy anyway? It only tells us what we already know. There is no use of stopping to take stock.

Granting that the scientific study of education could do nothing more than tell us what we really know and what we do not know about things educational it would be amply worth while. But it may do very much more. Suppose we knew specifically all that learning meant on its psychological side or had complete reliable records of the process of learning as it naturally works itself out in the various fields of acquisition, would we not know how the various things to be learned could be most economically acquired? Would we not know how the various school subjects could be most helpfully taught? Would we not know the specific rôle to be played by the teacher in economic learning? And this is but one of the many problems demanding solution.

When all the idlers, who throng our educational ranks, together with their scholastic advisers, come to feel the need of placing educational effort on a firmer basis than can be given by mere opinion and experience, when they come to consider it their solemn duty to investigate every problem relating to education and learning by the most exact methods that can be devised, the rôle of the teacher in economic learning will be fully determined and the work of the teacher recognized as the dignified profession it is, as high as any in which men can engage.

best ways of meeting them, as well as understand the psychological importance of their prompt and complete elimination. In a word he should know how that particular subject is naturally learned.

2. A teacher may be guidingly helpful in the acquisition of right methods of study and work, a phase of the teacher's problem often neglected. Students may learn unaided how to acquire a special type of habit in a natural and economic way. They may acquire a unique sort of special skill which can be carried over to other fields of learning and used whenever a similar type of habit is to be formed (7, p. 339), but the method employed is of the trial and error type. A skilled teacher may be of special service to his students in this process of *learning to learn*. It is his privilege to see not only that the best methods of work are acquired but that they are acquired in the most economic way.

3. There is a natural, economic way of acquiring the special habits formed in all kinds of learning. There are many unnatural, circuitous, wrong methods of acquiring them, methods which eventually succeed but with much loss of time and energy. It is the privilege of the teacher to see that the most natural and economic method of forming these specific habits be employed by his learners.

4. In all regular learning and even when a natural and economic method is followed many wrong habits of mind and hand are regularly formed. By skilled direction, given in advance, the teacher may entirely prevent or greatly minimize the formation and exercise of such interfering tendencies. One of the most important functions of the teacher is so to guide and direct his students that only a minimum of interferences will be formed.

5. In the matter of perfecting the specific habits to be formed the teacher, likewise, plays an important rôle. He insists that elemental habits are thoroughly learned, a process which cannot be neglected or slighted if the learning is to proceed in an economic way. He prevents the learner from pushing himself along too fast at the critical stages and prevents a too rapid presentation of details. By his careful direction he makes it possible for all details to be organized and assimilated in a natural way.

6. To yield the best results for the growth and perfection of the

associations to be formed a certain amount of regulated practice is required. It also appears, from the studies made, that definite periods of work and rest yield the best results for fixing the habits to be acquired. It will be the privilege of the teacher, when the most economic periods of work and rest shall have been determined to see that his students work in this economic way.

7. But it is not enough that elemental habits be perfected in this natural and economic way, they must as rapidly as possible be outgrown, reorganized into higher-order habits if progress in learning be not arrested. The natural tendency to be caught by the law of habit and to continue the work upon low planes of achievement when better methods of work may be acquired must be counteracted by special incentives to effort provided by the teacher. One of the special duties of the teacher is to provide such incentives to effort, and emotional helps, as may fully atone for the natural lapses in spontaneous attention which occur at the critical stages in the learning. By giving the right sort of direction and encouragement at these critical stages the teacher may eliminate most if not all the plateaus from his students learning curves.

8. It has been shown that it is intense effort carefully applied to the details of the work when the conditions are favorable for learning that forces the learners to make new adaptations in method. It, therefore, becomes the duty of the teacher to urge his learners on to greater endeavor when the conditions for learning are favorable for making inventions, and to encourage a more leisurely application of effort when conditions are unfavorable for the taking of such forward steps.

9. Many things, singly or combined, help or hinder the process of learning, such as fatigue, the hygienic condition of the learner, his immediate environment, variations in natural incentives to effort and the like. It is within the province of the teacher to make conditions favorable, both for the development and further perfection of the associations to be formed.

10. The task which taxes the powers of the teacher more, perhaps, than any other is keeping his learners always feeling well and developing in them an attitude of permanent interest in the work. By careful direction and wise encouragement on the part of the

teacher his students gradually acquire the habit of succeeding in all their tasks. This brings with it, quite naturally, the attitude of interest and the pleasant feeling tone so necessary for future success. The most rapid progress in learning is made when the students are interested in the work and feeling well.

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## HAS THE DRILL BECOME OBSOLESCENT?

### A PRELIMINARY DISCUSSION, PARTICULARLY WITH REFERENCE TO SPELLING

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Time was when the drill was the be-all and end-all of the educative process. In that day the three R's were sung to the wailing tune of the "rod, rule and remembrance." That time has happily gone by. But, in its wake has followed a reactionary movement which threatens even more dire consequences than such as undue emphasis of the drill could have produced. Today the child for the first time in history perhaps has come fully into his own. He is now to be his own arbiter in matters of educational controversy. His likes and dislikes, his interests and desires, are to furnish the final court of appeal. The doctrine of interest has been followed to its logical conclusion; and the child has spoken. He prefers to be entertained and amused, rather than disciplined, drilled or trained. In consequence the drill has become a byword in educational parlance; a sort of relic of past pedagogic barbarities. The picture becomes less gloomy, however, when we reflect that the drill has been completely proscribed only by those disciples of 'soft-pedagogy' who have not yet exercised any dominating influence upon the rank and file of the teaching body, and that a tendency is manifest in many quarters where the drill has been tabooed to return to its reasonable use as one of the legitimate instruments of the educative process. The many present-day attempts to introduce some form of group or class-individual instruction bear testimony to this return.



The objections urged against the drill are numerous. It has received entirely too much prominence, ranging all the way from the exclusive mechanical drills and the simultaneous repetitions of the typical Chinese school to the rote memorizing of text-book and dictated statements in the average American school. It represents the line of least resistance for the naturally slothful; it is the lazy boy's refuge; or it is a monotonous grind against whose intolerable drudgery children rebel, or to escape from which they flee from the school in dismay, and which produces nothing but servile followers, educational stokers and hewers of wood. It fosters the pernicious habit of cramming. More than this, it is uneconomical, for it steals the child's time. He is obliged to spend his time going over old materials when he should be acquiring new facts. Instead of being nourished his powers are being deadened. Finally the drill, in practice, proves inefficient, as shown by experiment. As evidence in point, the anti-drill advocate refers to Stone's study of a drill subject like arithmetic and quotes his conclusion to the effect that a superior product in arithmetic will be found about as frequently in schools devoting less than the average time to arithmetic as in those devoting more than the average time, the amount of time spent in preparation being no guarantee of efficiency. Or he refers to Rice's study<sup>1</sup> of spelling, a drill subject, and his findings against the spelling grind; or to Cornman's investigation<sup>2</sup> of the results of teaching spelling by the incidental method (without regular study and recitation periods), and to his conclusion that the present spelling drill "adds little or nothing to the effectiveness of the mere incidental teaching of spelling," and that its importance is thus practically negligible. Or reference is made to current practice in the teaching of modern languages. Instead of drilling on new words and vocabularies, as formerly, the student now begins with copiously translating and using words. The amount of reading is increased to compensate for the reduction of time devoted to drill. Conformably to the *ipse dixit* of these experimenters we

<sup>1</sup> Rice, The Futility of the Spelling Grind, The Forum, April and June, 1897.

<sup>2</sup> Cornman, Spelling in the Elementary School, 1902.

find F. M. McMurry<sup>3</sup> predicting that extensive drills in the future will be the recourse of those teachers who lack the energy or the ability to think.

What can be said in reply to these criticisms? What arguments can be advanced on the other side of the question? Most of these arguments we can only state point-blank fashion in the present discussion.

1. It is probably an exaggeration to say that the child reacts against or abhors the drill. Repetition may be wasteful, but it is certainly easy, and there is a time when the child takes a positive delight in iteration and repetition. Naturally so, because the process has an instinctive basis: the circulatory reactions of imitative actions.

2. The child stands in need of certain intellectual habits as well as motor habits. Certain mental operations should be reduced to an automatic basis. Many experiences must function unconsciously; *e.g.*, the association between certain visual symbols and certain sounds (spelling), the manipulation of the fundamental mathematical processes, the practical application of the rules of grammar, the conversion of the moral and social truths enforced by history and biography into fixed and dependable modes of response, the considering of evidence, holding fast to points, evaluating premises, facts and conclusions, and actually thinking and expressing thought in conformity with the laws of thought and expression:—these and similar intellectual processes should be reduced to fixed habits. James' statement is scarcely exaggerated: over 99 per cent of our actions are purely automatic. To make the unvarying intellectual processes habitual is to free judgment for the problematic situations of life. In the field of motor habits (piano playing, writing, legerdemain, military drills, etc.) there is no other recourse than to practice, and the central element in practice is repetition. It would seem inherently probable that repetition is valuable not only in the field of motorization but also in the field of purely mental or intellectual automatisms.

<sup>3</sup> McMurry, *How to Study and Teaching How to Study*, 1909. Chapter VII.

3. Experiments indicate that frequency or repetition is one of the most important factors in recall—experiments by Calkins, Ebbinghaus, etc., which we cannot here detail.

4. In the average drill little if any effort has been made to appeal to the variety of mental imagery found in children. The drills have not been adapted to the differences in ideational type, hence the best results have not been obtained.

5. Too many drills have been characterized by an unvarying repetition of the same processes or problems, instead of requiring the child to apply the facts or principles gained to new instances or situations; hence the alleged stultification.

6. The average drill has been too formal in the sense that it has not been motivated or vitalized by being related to some dynamic purpose or vital need. By making the child clearly apprehend a relevant situation and feel his need for solving it the repetitions can be made dynamic.

7. Cornman's results, which seem conclusive and which certainly rest upon a painstaking enquiry, are subject to the following special objections:

a. The "list of spontaneously written words" and some of the "composition tests" enabled the pupils to select their own words. Naturally when a choice of words obtained for expressing the same thought in writing those most readily written, most easily spelled and most familiar would be selected. Obviously the child would at least shun those words which he knew he could not spell. Moreover, the vocabulary in such writings would be characterized by a paucity of words. But in life situations, in the conditions which confront the stenographer, reporter, etc., an arbitrary choice of words does not present itself. The validity of this criticism is indicated by the "column tests," which show a low percentage of efficiency and which contain unusual words, as compared with the other tests. In Rice's results the difference between the column lists (which did not permit any selection), and the sentence and composition tests is very striking: from 15 to 30 per cent.

b. This fact will partly account for the high percentage of correctly spelled words—unquestionably high—found by Corn-

man, which will render the results, to this extent, delusive. The following fact also partly accounts for the high grade of efficiency found.

c. The experimental series of incidental spelling involved a certain amount of *specific* spelling instruction or drill, in *that* words which were liable to be misspelled were placed conspicuously before the pupil when writing on topics in which they would probably occur. Besides the children were permitted to refer to the dictionary or the teacher when in doubt; and pains were taken also to anticipate mistakes.

d. What percentage of words not misspelled in the special test was studied before from the spelling books when the latter were in use? The answer to this question has a bearing upon the problem at issue.

e. It is also necessary to know what percentage of the words in the "superintendent's term examinations" had been previously studied in the regular spelling exercises. One of these examinations came five months after the abandonment of the spelling exercises, and two, one and two years, respectively, later. It is worthy of notice that the experimental classes do not show as good results in the two later examinations (a loss of 4.1 per cent for the primary classes). This would indicate that the superiority in the earlier examination was due, in part at least, to the residual effects of the previous special spelling exercises. The residual effects would naturally grow weaker after a lapse of a couple of years.

f. Pursued to their logical conclusion Dr. Cornman's results would convert systematic instruction and organized curricula into pedagogical monstrosities. If specific instruction or drill in spelling is valueless, why are they not a sheer waste in other branches as well? Accordingly why not do away with specific instruction or drill in the various subjects, and also the articulated curricula, which obtain in the schools at present? Leave all acquisition to merely incidental acquirement. Let the child get it in dragnet fashion; and let him effect his own concatenations and articulations between the various data of knowledge. The school would thus seem to offer but slight advantage over the

home, street, shop, or field, except that it might afford a richer wealth of material for such incidental acquisition. Cornman foresaw the logical inevitableness of this conclusion, and hastened to say that only the modes of expression arising inevitably and naturally should be left to incidental instruction. But that spelling does not thus arise seems to be the reproach of the old persons of our acquaintance who have not been schooled and whose spelling is anything but ideal. On this point Rice's results teach no uncertain lesson. The schools which had abandoned the spelling lessons for incidental spelling instruction gave poor results in the column test. The children spelled the simplest words in the most absurd fashion. And this indicates the weakness of the incidental method: not only does it not allow of a graded course in spelling ("from the simple to the complex") but it tends to neglect the common everyday words easily misspelled in its emphasis upon the unusual or technical words which occur in the other subjects, to which spelling is made an incident. Some time ago I observed children in a physiology class learning the following list of words from the board, which they were required to use in a composition they were writing: stomach, inanition, oesophagus, epigastrium, lymph, osmosis, ptyalism, autointoxication, saliva, bile, blood. They were taught spelling by the "natural method."

The average person does not pick up the school arts along the way; they must be acquired in the conscious attempt to realize a clear ideal or attain a well-recognized standard of excellence. Skill is not heightened by practicing beneath the level of one's best possibilities; and these possibilities are approximated only as attention is focalized upon some pattern of possible attainment. This is particularly true of linguistic expression, which is more difficult than spelling, reading or numerical computation. The attempts of the "Harvard Committee on Composition" to limit composition to extemporaneous composition, and the "Committee of Ten" to displace formal language exercises by incidental language training, do not commend themselves because they are not in accord with the laws of habit formation, as will be seen presently. The recommendation of the "Committee of Fifteen,"

that both regular and incidental language exercises should be provided, is more in accord with the laws of mental growth.

g. Perhaps the chief criticism of these results, however, is that they do not constitute an indictment of the spelling *drill* proper, but rather of specific spelling *study* and instruction (which, moreover, the incidental nature of the work did not exclude), and cannot thus warrant the sweeping conclusion that the "spelling result is a function of the general pedagogical health of a class . . . a constant quantity altogether independent of the method of teaching," and particularly that there is no discoverable relation between the time spent on specific spelling drills and the results. For there certainly is a distinction between mere study and drill. What Cornman refers to as drill amounted simply to a certain number of minutes of study of a spelling lesson at school or at home, and to a given number of minutes set aside in the program for a spelling recitation—"a specific spelling lesson, taught, studied and recited in oral or written form." To educative processes of this nature it would be well, in the interest of clear thinking, to apply the word *study* (and reciting), and restrict the term *drill* to a process which is differentiated from mere study in various particulars. To be sure, both studying and drilling contain common elements; and yet, properly conceived, they are not synonymous processes. There are certain aspects of study which receive a distinctive emphasis in the drill.

8. My final reply, then, to the objections to the drill is that the alleged inefficiency of the drill is not inherent in the drill as such, but pertains to a brand of drill which, if it can be considered to merit this name at all, does not properly conform to the demands required of a genuine drill. If there is any weight to this criticism it must be possible to point out the criteria of a good drill. By what standards of excellence shall the effective drill be known?

Inasmuch as the central element in the drill is practice or repetition and its central aim is the production of a certain measure of automatism, it must be governed by the same factors which preside over the formation of habits. A good drill follows the law of habit formation. The effective formation of habits has been reduced to a law by psychologists, and is now well under-

stood. However variously stated, this law involves three fundamental elements or phases. If I set out to train the child to write, for example, I have as the goal of my endeavor the making of certain writing movements (lines, curves, forms) relatively automatic: writing is a *tool* that must be automatized in order to free attention for matters requiring judgment or thinking. My first concern then is to catch the child's attention and to concentrate it upon the process which I wish to mechanize. I do this by directing the child's attention verbally to what I want done. I show him the form which he is to imitate; I reproduce the form myself before his eyes, so that he obtains a visual-form image and a visual-motor image of the letter. I also induce him to trace himself the movements, which he has observed, and he thus derives a tactual-motor series of images of his own movements. By such expedients as these I succeed in getting the pupil to concentrate his attention upon the process to be made the subject of drill. The first element in all drill is thus the initial focalization of attention upon the process to be drilled upon. In too many drills no attempt is made to secure this initial focalization. The child is given no clear idea of what he is to do; there is no clear ideal or aim to guide and vitalize the process. And sometimes the tasks presented are so multiform that initial focalization is quite impossible.

Consequent upon the initial focalization, there must be *attentive* repetition. Our child must keep repeating his writing form after he has the image of it in mind. But merely mechanical or rote repetition will not suffice. If he keeps his attention upon the passing throngs outside of the window his repetitions will avail him little, so far as concerns automatizing the imitations of the form in question. Such repetitions will degenerate, and produce a copy which grows increasingly inferior to the model. It has been frequently noticed that as the reproductions approach the bottom of the copy page, or get farther and farther away from the model in space, they also grow more and more dissimilar. The quality of the attention has degenerated. In the average drill the child repeats without having his thoughts upon his work the results of the drill are consequently disappointing. But then

the conditions of the drill are not being supplied. The vital practical problem here becomes one of keeping the child's attention riveted upon his reiterated tasks.

Nor is this all: in the genuine drill the attentive repetitions must be continued until the stage of automatism has been reached, or at least closely approximated. If the child grows weary his efforts will count for little; they will yield a very meagre fruitage. The practice effects will vanish unless the neurone modifications have been thoroughly solidified and rendered stable or persistent. Our hereditary habits, or instincts, do not thus vanish because they rest upon a stable neural substrate. What has been found essential in the organization of racial habits can not be dispensed with in the formation of individual habits. The music teacher, prestidigitator, and drill master in the army, recognize the importance of this final element in habit formation. It is safe to say that in the average drill this final stage is never completely reached. Not only have the initial concentration and the attentive repetitions not been exacted, but the mechanization has not even been approximated. The child has been given so many words to learn to spell that no effective concentration has been possible; his desire for constant change and variety has been so condoned or coddled that there has not been even a semblance of attentive repetitions; and the meagreness of the results has been attributed to the drill, albeit the drill supplied none of the essential conditions of the drill technique.

It is with the latter thoughts in mind that I wish to refer, briefly, to a spelling drill which has been in use in the Cleveland schools during the last three years, and which supplies, in a measure, some of the requirements of the drill as properly conceived.<sup>4</sup>

First, as affects initial concentration. Instead of dispersing the child's attention over twenty, thirty or forty new words each day, the plan requires *intensive focalization* upon *two new words* only (eight other subordinate or review words are a part of each day's lesson). These two new words are rendered conspicuous typographically: they are printed prominently in large type at

<sup>4</sup> This drill is the fruit of the labors of Asst. Supt. W. E. Hicks, of the Cleveland Schools. Cf. Hicks, *Champion Spelling Book*, American Book Co., 1909.



the head of each day's lesson, thus attracting attention through the laws of primary passive attention. With these two prominent words as points of departure the child is required to construct sentences of his own. This not only makes for continued focalization of consciousness upon the new words to be mastered, but requires the application of the words in the only way in which spelling becomes a matter of moment in the workaday affairs of life—in a connected series of words or written composition.<sup>5</sup> Before thus using the words the pupil is required to ascertain their meanings where doubt exists, and this tends further to converge attention upon the word. During the course of a week ten dominant words have thus received concentrated attack. The conditions of initial concentration have thereby been supplied.

Second, *attentive repetition* is insured in this plan by a scheme of systematic drills and reviews. These are secured by having the prominent words focalized during the week recur during the course of the next two weeks among the subordinate words; by making them the subject of special review once a week; by providing oral and written interschool contests at the end of every eighth week, based upon the 80 words focalized and reviewed during this period; by providing similar annual contests; and by taking the words up again as subordinate words during the following year. Each focalized word is thus reviewed five times within two years. To vitalize the process and secure attentive repetitions recourse is had to these interschool and interclass contests. The contests are held between all the schools of the same grade in the system. The names of the schools are conspicuously bulletined in the press and in special circulars in the order of excellence. The child's attention is motivated by appealing to his instincts of emulation, rivalry, and pride in the superior excellence of his class and school.

<sup>5</sup> A stock objection to the spelling drill is that efficiency in spelling *word lists* does not transfer to *connected composition*—the familiar objection to the doctrine of formal discipline. I am at present making certain investigations on this and other aspects of the spelling drill, the results of which will be embodied in future articles on The Psychology and Pedagogy of Memorizing and Drilling, and A Test of the Transfer of Spelling Ability Acquired in Column Drills to Dictated Compositions.

Third, the focalization and repeated reviews already described should have resulted in a fairly high degree of automatic mastery of the spelling of somewhat less than 2000 focalized words during a period of six elementary school years (more words are included in the Spelling Book, but they have not been subjected to this thoroughgoing drill process). I propose in what follows to refer briefly to the results of tests which evince improvement in spelling in the Cleveland schools since this spelling drill, which supplies in fair measure the conditions of the genuine drill, was introduced.

In the first interschool spelling contest the pupils of the eighth grade averaged 1.5 words per pupil incorrectly spelled in a total of 120 words. In the corresponding test one year later, 1907, or one year after the introduction of the drill described above, the average number of errors per child was only .483 of a word. In 1908 a test, embracing 50 words, given by a specially appointed educational commission in 1905 (consisting of Presidents Howe and Thwing, and Professor Avery), was repeated with all the pupils of the city in the same grade. In the 1908 test the average number of misspelled words per child was three, as against thirteen in 1905. The spelling efficiency had increased from 74 to 94 per cent. Similarly, a test given in Chicago was repeated in 72 eighth grades, giving an *average* spelling efficiency of 84.17 per cent. This figure attains its significance in view of the fact that 84 per cent was the record of the *best* individual eighth grade in Chicago, while a slightly higher percentage was the average of the 72 in Cleveland. Better known is the 1908 N. E. A. Spelling Contest, in which Cleveland scored the highest success. The contest was based upon the Lord-Baylor--Brown-Stone list of words. In this Cleveland totaled 40 errors, while Pittsburg totaled 47, New Orleans 66 and Erie 85. The following year a spelling test given in Cleveland in 1858 was repeated, with the result that the average was one misspelled word less per pupil than in 1858. In one of the early tests of 1909, given to the pupils of the seventh grade of two schools, composed largely of Jewish children, out of 12,800 possible mistakes only "one boy in each school made one error." In the annual contest of May,

1909, the spelling proficiency in the fifth grade reached 95 per cent; in the sixth grade, 96 per cent; in the seventh 97.16 per cent and in the eighth, 97.2, or a general average for these grades of 96.34 per cent.

In the eighth-week contest in November 1909, 21,290 of 35,098 pupils in the various grades gave perfect returns in both the oral and written contests, and the average was 1.235 incorrectly spelled words for each pupil in both tests.

In the corresponding contests in January, 1910, 17,127 of the 33,364 pupils spelled all the words correctly, and the average number of errors per pupil was 1.698.

In the oral contests of last March in which 33,928 pupils in the third to the eighth grades inclusive partook, the number of misspellings was 9,971. The total number of possible chances to misspell was 6,785,600, or, since each pupil spelled only five words, 169,640. This gives an average efficiency of about 94 per cent, which is quite satisfactory in view of the conditions: each pupil received only five chances to spell from a list of 200 words. Perfect grades were obtained by 5,377 pupils. In the written test, on the other hand, in which was included homonyms on which there had been no systematic instruction or drill, the efficiency dropped to 89.6 per cent.

Here we have a degree of efficiency produced by the application of certain fundamental elements of the drill that is impressive. Certain facts will add emphasis to this impressiveness. The spelling contests in Cleveland are conducted under rather rigorous conditions: i's not dotted and capitals not properly used count as mistakes; the written work must be corrected by two teachers; a second teacher must keep the record in the oral contests. Furthermore, the spelling drills in the elementary schools of Cleveland consume only 5.96 per cent of the available time, as compared with 7.22 per cent, which is the average for a number of the leading cities of the country. Moreover, these results present a striking contrast to the results of Rice's column and sentence tests for 16,000 children in twenty-one cities of the country.<sup>6</sup> Here the spelling

<sup>6</sup> These tests, repeated in Philadelphia, gave similar results.

efficiency ranged from 53.5 per cent, in the fourth grade, to 84.4 per cent, in the eighth grade. In another test carried out by Rice himself the averages for entire buildings ranged from 73.3 to 77.9 per cent. Only in the case of fifteen schools for the *eighth* grade did the results approximate to any degree perfect scores. This was in the case of a composition test which did not seem to be sufficiently difficult to set any problem to pupils of their attainments. The words used in the Cleveland tests differ for the various grades, and many of them are difficult words. In fact, the lists are compiled from words submitted by the teachers as most frequently misspelled.

It is by no means evident that modern pedagogy demands the substitution of incidental spelling instruction for the spelling drill. It is still less evident that the schools have outgrown the drill in the other formal branches of the curriculum. To my mind, it is no more a question of drill or no drill. It is a question of a pedagogically adequate drill, as against a slipshod, happy-go-lucky drill. It is a question of evolving and economically using a psychologically justifiable drill technique. This aside, the attempt to solve questions of teaching method solely by appeal to opinion will prove about as futile in future as it has done in the past. At best, such opinion is valuable merely as furnishing starting points, as setting problems, and as checking or confirming results otherwise obtained. Opinions from the actual classroom craftsmen will always be valuable, but they are not the final court of appeal. Eventually questions of this sort will be settled by the method of controlled experimentation, just as questions in medicine, hygiene and diatetics are no longer settled by the *opinions* of physicians, but are now being decided in the laboratory. It is the function of the new science of experimental pedagogy to evolve an experimental technique adequate to the solution of pedagogical questions. Just as mooted points in psychology are now, to a great extent, referred to the psychological laboratory as a matter of course, so in some not distant day mooted questions in pedagogy will be referred as a matter of course to the pedagogical laboratory or the experimental school. The ordinary tests, carried out in random fashion in schools where no

specific methods have been followed and where no control of conditions has obtained, must yield results of doubtful validity. It is because uniformity and a fairly high degree of control of conditions have marked the spelling work in Cleveland that I have ventured to use these results as the basis for this paper and to contrast them with results of tests obtained elsewhere.

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In a recent editorial the *New York Times* presented the following exercise in support of its contention that the passing mark for promotion in the grades should be raised to 90 per cent. "Here is a specimen of the scholarship of a boy 15 years old, American born and bred, who has been promoted to the grade of 8A, the highest but one in the city's grammar schools:

DICTATION.

They attenmed no rausch gast, therefor, at that stage of the problem. "Boys also out teacher said," like to have it," Thought, when it get into a boy poctey, I believed it is oftended say to burned a hold there. Instinly twelty out strech hand indecake an Idle demaning utterans in twelty head "If you pleas "sir" I know what it is" "Well, what is it?" "A pice of cold?"

"Here is the passage "corrected," the teacher spelling out each word dictated, the pupil writing his version of the spelled-out dictation:

They attented no rash gess. therefore at that stage of the problem. "Boys also our "teacher said" like to have it," thought when it get into a boy potet. I believe it is often said to bruned a hold there, Instanley twelty outstretch hand indicate an idle "If you pleas sir" "I know what it is" "Well what is it" "A pice of cold?"

"The key to the passage follows:

They attempted no rash guess, therefore, at that stage of the problem. "Boys, also," our teacher said, "like to have it, though when it gets into a boy's pocket, I believe it is often said to burn a hole there." Instantly twenty outstretched hands indicated an idea demanding utterance in twenty heads. "If you please, Sir, I know what it is." "Well, what is it?" "A piece of coal."

"The samples presented above, together with some others by older boys, that display not much greater proficiency, are submitted to *The Times*, in manuscript, as typical of work done in the 8A grade by not less than one out of every eight pupils in Greater New York."

## ABSTRACTS AND REVIEWS

- A. VON SYBEL. *Ueber das Zusammenwirken verschiedener Sinnesgebiete bei Gedächtnisleistungen.* (Zeitschrift für Psychologie, 53: N. 4 u. 5, 1909, 257-367.)

This monograph reports the results of a very elaborate series of experiments undertaken to determine the way in which the various sense departments cooperate in memorizing nonsense-syllables. The three types of sensation that may function in such work are, obviously, the visual, the acoustic, and the kinaesthetic. It is possible to utilize any one of these alone (or, better, to emphasize the activity of any one, and minimise that of the others); or any two or all three may be combined in various ways. The object of the experiment was to determine the combinations that were most favorable to economy of learning. The following combinations were tested:

1. *The visual-motor-auditory series.* In this series, the observer read the syllables (which were exposed upon the revolving drum of the kymograph), and simultaneously pronounced them aloud, taking care to speak very distinctly.

2. *The visual-motor series.* The observer read the syllables and articulated them without sounding them.

3. *The visual series (a).* The observer read the syllables visually, inhibiting as completely as possible all speech-movements. (At first this condition was fulfilled by holding the tongue between the teeth, but this introduced a distracting element too serious to be overlooked; in the later tests, the observer was simply instructed to inhibit as much as possible.)

4. *The visual series (b).* The observer was permitted to employ any motor reaction that he wished, so long as it was constant throughout the test, and so long as it did not involve speaking aloud.

5. *The visual-auditory series.* In this the observer read inaudibly but, simultaneously with his reading, each syllable was pronounced by the experimenter. It was left to the observer whether he would direct his attention more to the acoustic than to the visual stimulus. The motor reaction was also a matter of choice with the observer, except that

he was not permitted to pronounce the syllables audibly, nor to vary his motor response.

6. *The auditory series.* In the experiment with acoustic stimuli the experimenter read the syllables from the kymograph, while the observer listened passively. In the reading, accenting was avoided, but the experimenter dropped his voice slightly at the middle and at the end of each series. The motor attitude of the observer was determined as in the visual auditory series.

With unimportant exceptions, the stimulus series were of the normal twelve-syllabled type. The revolution-time of the drum was arranged for each observer according to the degree of his practice and of his motor readiness, except that the time was always as brief as possible. Sybel employed in his experiments a combination of the "learning method," and "the scoring method" (*Erlernungsmethode* and *Treffermethode*). The test for the latter method occurred usually after five minutes' work on the series. Careful introspective records were kept by the fourteen observers throughout the experiment. The observers' memory-types were first determined, and the classification of the results is upon this basis. For purposes of comparison, a series of tests was made with meaningful materials, selections from Tasso's "Jerusalem Delivered" being employed for this purpose.

From the mass of data thus collected, Sybel draws a number of conclusions. Many of these are of interest chiefly to those who are working in the field of memory-experimentation. Others, however, are significant to educational psychology, and among these the following are, perhaps, the most significant:

1. In general, reading aloud is more favorable to rapidity of learning than is silent reading. The advantage of reading aloud is the greater the more rapid the tempo, and the more marked the motor tendency of the learner. The number of right associations (the test of the "scoring method") is almost always greater in the visual series than in the visual-motor-auditory series. The difference in favor of the visual series in this respect is the greater the more rapid the tempo.

2. Adding the acoustic element to the visual (as in the visual-acoustic series) increases the rapidity of learning. The number of right associations, however, is higher in the visual series.

3. Adding the articulatory element to the visual decreases the number of repetitions necessary to learning and this is true for the sensory type of observer as well as for the motor type; but, as a rule, it also lessens the number of right associations.

4. In the acoustic series, the addition of the articulatory factor shows a smaller influence on the number of repetitions essential to learning than is the case when the articulatory factor is added to the visual.

5. Contrary to expectation, the auditory series required, even with visual observers, fewer repetitions than the visual series (assuming like motor tendencies).

6. Deviations from Ephrussi's law (which asserts the direct dependence of learning-time upon rapidity of reading) appear in the visual-motor series more clearly than in the visual-motor-auditory series; while in the visual series, learning is interfered with in a marked degree by rapid reading.

7. In general, the results of the tests on the learning of meaningful materials, in so far as the repetition-values are concerned, run parallel with the results for the nonsense-materials.

8. With regard to the superiority of the visual-motor-auditory series, it would seem that the regular recurrence of the sound-stimuli and the necessity for articulating the syllables are the important conditioning factors. They form, as Sybel expresses it, a "discipline for the attention." The sharp external sound stimulus seems also to favor a more effective acoustic association than is possible otherwise. Articulating the separate syllables similarly encourages kinæsthetic associations, and also brings with it a more precise apprehension of the syllable, particularly in respect of the consonantal values.

9. On the other hand, the learner who is strongly sensory in type may be distracted by the sound of his own voice, and by the necessity for articulating.

10. In connection with the auditory series, many observers found it necessary to visualize the word as spelled, a process which quite naturally lessens the rapidity of learning.

W. C. B.

GEORGE HERBERT BETTS, Ph.D. *The Distribution and Functions of Mental Imagery*. Teachers College, Columbia University, Contributions to Education, No. 26. (New York: Teachers College, 1909. Pp. 99.)

This book contains an account of 16 experiments conducted upon students at Cornell College and at Teachers College upon voluntary and spontaneous imagery (verbal imagery being expressly excluded from consideration.) The conclusions may be summed up in the following



propositions: (1) Most persons have a wider range of imagery at their command than they normally employ in thinking. (2) Imagery tends to appear in consciousness, either (a) when our thinking is baffled, or (b) when perceptual content would be of obvious value. (3) Thinking not only can, but usually does go on without the intervention of imagery, and when imagery is present in the background it is often not essential to meaning. Meanings of a logical sort (relational experiences), in particular, are not images and are not dependent on images. (4) Such mental activities as discrimination, memory (recall), and the appreciation and enjoyment of literature can, similarly, go on without imagery and such imagery as appears may be incidental, if not positively disadvantageous. Thus, the 'memory image,' as a general term for all memory stuff is a fiction.

To reach these conclusions, Betts employed for voluntary imagery a questionnaire which may be regarded as an extension of those of Galton, Titchener, and Thorndike, and for spontaneous imagery both what he terms the "method of interrupted thinking," and simple introspection of typical mental activities, *e. g.*, of mental multiplication, free association, selective thinking, simple logical processes, recall, interpreting music, etc. We note that the term discrimination (of pitches, grays, etc.) is applied to a process of identification from memory which is rather far removed from a process of discrimination.

In all this work the so-called introspection is evidently on the amateurish level. It is mere description, not analysis, and the general scheme of the work is that of compiling, averaging, correlating and otherwise subjecting to statistical treatment a mass of second-grade introspective material. We doubt whether the function of the image can be determined by such a method.

One questionable point of technique is the use of a "guide to introspection" (p. 52), which is given to students "to help train introspection." Our experience has been that such a guide should be built up after, and on the basis of, preliminary introspective reports. If it is given to the observer outright at first, it can scarcely fail to govern and control the introspection to an unwarrantable degree.

Speaking of technique, again, it may be doubted whether Betts' elaboration of the questionnaire has enabled him to avoid the "loose and general answers" which he says characterize returns to the Titchener questionnaire—a piece of work which he considers "far below this author's usual high demands for scientific accuracy." To which it might be replied that the limitations of this questionnaire have been clearly pointed

out by Titchener in his *Instructor's Manual* as well as in other places (*e. g.*, *Jour. Phil., Psych. & Sci. Meth.*, 1: 1904, p. 39).

In several places, the writer implies that since, under specified conditions, a given type of imagery can be absent from the minds of a number of persons, its presence in the minds of others under the same conditions is accidental and contributes nothing essential to the thought-process in question. This is, of course, a treacherous generalization, as numerous illustrations in the literature of the experimental psychology of thought will show.

In general, we miss in this book an appreciation of the real problem involved. There is no evidence that Betts is familiar with the contributions of Bagley, Bovet, Messer, Sidgwick, and Segal, or of Washburn, Bell and Mückenhaupt, to mention only a few of those who have attacked the problem of the image and its relations to the thought-processes.

G. M. W.

EDWIN A. KIRKPATRICK, Ph.M., Editor. *Studies in Development and Learning*. Contributions from the Department of Psychology and Child Study in the Fitchburg Normal School made by the Advanced Class of 1907. Archives of Psychology, No. 12, March, 1909. (New York: The Science Press. Pp. v + 101.)

Professor Kirkpatrick has given us here in brief form the important conclusions, with tables, curves and enough data to justify the conclusions, of the theses presented for graduation of one of his recent advanced classes. While seventeen titles are given, but fourteen theses are summarized. These are distributed through a number of fields of prime interest to psychologists and teachers of today, including physical tests and measurements, development of auditory and visual memory, development of quickness of perception and movements, of the artistic sense, of penmanship, the curve of learning, fatigue in habit formation, ways of learning visual forms, how children study, musical learning, and a few other topics.

Except in minor details, the conclusions presented are but verifications of well established principles. To most of the discussions the editor has prefixed an explanatory note as to methods, conditions, etc., and has added a final paragraph calling attention to the more significant results. The practice in the Fitchburg Normal School of keeping continuous records of all the pupils in their training school throughout

their entire attendance on the school has accumulated a mass of data which yield much more significant comparisons for different ages than data collected from children of different ages at the same time. In this respect some of the studies are unique.

On the whole the work of the students contributing the studies has been well done. It certainly compares favorably with similar work of undergraduates in our best colleges. While in some instances the limited experience of the authors leads them into an over-emphasis of the commonplace, in other cases commendable discrimination is shown. In the longest and, in most respects, the best study of the group on "The Curve of Learning," Miss Munn has introduced a variety of conditions and a variety of subjects which cover the field very satisfactorily in an elementary way.

The chief service of these studies to education, it may be predicted, will be in their suggestions as to simple and valuable investigations in the closely related fields of experimental pedagogy and practical child study. I know of no single volume which contains so much of practical utility for the normal school department of education seeking to develop the experimental side of the work without the use of apparatus.

WILL GRANT CHAMBERS.

Department of Education,  
University of Pittsburg.

GERTRUD BÄUMER and LILI DROESCHER. (Compilers of) *Von der Kindesseele: Beiträge zur Kinderpsychologie aus Dichtung und Biographie*. (Leipzig: R. Voigtländer, 1908. Pp. 428. Mk. 6.)

The compilers of this book have collected from the works of some 60 authors, mostly German, passages that bear upon child life. Extracts appear from Björnson, v. Bülow, Darwin, Freytag, Gorki, Liechtenberger, Richter, Carl Schurz, Tolstoi and other well-known writers. The selections are grouped to accord approximately with the development of the child's mental life, under such headings as earliest impressions, discovery of the world, first attempts at speech, children's letters, childish joy and sorrow, love of nature, fears, views of death, dreams, play and playthings, the theology of childhood, religious instruction, dishonesties, jealousy, self-control, the home life, social education, friendships, school life, etc. The use of the book is facilitated by an index of subject-matter and an index of authors.

Such a collection is surely useful, particularly on account of the use made of biographical material. The English reader will regret to find that German script has been employed.

G. M. W.

LAURA L. PLAISTED. *The Early Education of Children*. (Oxford. Clarendon Press, 1908. Pp. xiv + 398. \$1.50).

This is a book of a type much needed. An experienced school administrator has evidently kept herself carefully in touch with the actual teaching of children and at the same time has been in close communication with parents, physicians, and other teachers. She has not been unacquainted with, nor afraid of the experience found in the history of education and she can use ideas found in America without feeling called upon to denounce English conditions and customs.

A straightforward statement of actual work from such a source cannot fail to have value, whether the reader believes in the practice or not. The English infant school is oftentimes a discouraging institution; there is in many cases little besides mechanism and that mechanism is at times so effective in turning out the formal results sanctioned by habit that its most earnest critics almost despair of reasonable progress in reconstruction. One of the most successful directors showed me marvelous formal work on the part of children of five to eight and then said: "But it is not worth while. These children are no better off in formal work at ten or twelve than others who have escaped this grind and they lack the background of concrete experience which means most for the later years."

Miss Plaisted has knowledge of things as they are and goes ahead in pragmatic fashion doing the best that is in sight. There is clear evidence of a desire to conserve the older English interest in physical welfare and games as well as the best elements of the Pestalozzian influences which in their less free aspects so long were potent in English primary education. The Herbartian wave has left its imprint, perhaps less worked over than the other forces. The most striking influence is that of Froebel—a much more recent factor in England than in America. The Americans who have entered into this synthesis are most notably Dr. Harris and Miss Blow. Acquaintance with the Washington schools is shown and the influence of Miss Bentley of that city on the music is evident. It seems strange not to find acquaintance with the work of Teachers College at Columbia or the School of Education at Chicago. There is a next step which, whether the author approves of it or not, needs to be known and

evaluated in giving a book of this kind greatest effectiveness. This is perhaps best seen in this country in the work of Professor Dewey and in England in that of Professor Findlay in the Demonstration Schools of the University of Manchester. The transition of the latter from the Herbartian influence to that of Professor Dewey marks an assimilation of Herbartianism missing here.

It is possible that the practical service of the work in meeting present needs in England may be greater than it would be were the statement more complete on the experimental side. The material is in two sections—the first of 102 pages is for *The Child Under Five*, the remainder of the book is concerned with the ages five to seven. There is an appendix on *The Medical Responsibilities of the School Teacher*, by Dr. A. L. Ormerod, medical examiner in the city of Oxford, which is a sensible statement of facts teachers ought to have at hand regarding diseases, defects, the hygiene of sleep, food, clothing, etc. There is evident throughout the book greater familiarity with official reports on education than is common with our principals and teachers.

A clear conception of the necessity of experience as a basis for any formulation in the three R's, etc. and the fallacy of real growth without initiative and leisure is seen. There is no danger that in this school a boy's time would be so filled as to give him no room for choice and responsibility.

The writer is very sensible in her use of the persons she has chosen to follow. Froebel's work is seen as a unifying force of especial value to less trained teachers. She may be over sanguine concerning the value of Froebel's songs, but it is clear that as soon as she is convinced of better material that can be used by ordinary people, the old will go. Miss Blow is used freely; there is no evidence of antagonism, although the mixture of Froebelian material with that from other sources would grieve that lady seriously. Old devices linger as the use of "central thoughts" like the following, for the work with children under five,—"*The wonder and infinity of the works of the Creator.*" The process of learning to read as here stated must seem over complicated to a young teacher, although there is a sensible attitude toward the various methods in use. It would be easy to find flaws, but on the whole there is so much good sense in the accumulation of material, the balancing between old ways of doing and short cuts, between the ways of necessity and leisure, that one would trust the school with a child and would recommend the book to students of real situations.

FRANK A. MANNY.

Kalamazoo, Michigan.

FRED LEWIS PATTEE. *Elements of Religious Pedagogy: A Course in Sunday School Teacher-training*. (New York: Eaton & Mains, 1909. Pp. 224. 75c.) (Approved as an advanced standard course by the committee on education. International Sunday School Association).

This book contains thirty-four chapters divided among three parts on child study, some elements of psychology, and the art of teaching, respectively, and includes a reference list for supplementary reading on these fields and on the Sunday school. Written in a readable style, it seems calculated to reach and benefit mainly readers who have had no professional training for teaching and no advanced general education; in the three fields covered, a general though fragmentary survey is given in the different chapters, with more or less constant application to the problems of the Sunday school. But such pertinence to the main issue is rather incidental and indirect in Part II, and throughout the book there is much general material that could have been omitted if readers were supposed to have any general knowledge in these fields. Recalling the average Sunday school, poorly organized, without educational supervision, dependent on voluntary and too often superficial teaching, its whole educational process out of touch with the pupils' needs and the modern educational world, the critic may judge that a book aiming to raise the efficiency of workers in this field must not be "too good for human nature's daily food." It is to its credit that it utilizes some of the best recent material in the way of expert educational theory, though there is some intermixture with views more dubious and antiquated.

The author insists that the pupil and his needs must be the starting point and center of the whole work of the Sunday school; he dwells on the different stages of development and their leading characteristics; he would enrich and adapt the curriculum; he believes in the value to the teacher of even a rudimentary knowledge of psychology; he magnifies the importance of habit forming in education; he emphasizes the importance of the teacher's intelligent preparation of lessons, of the dominance in the lesson of a clear aim and a central thought, and of procedure according to the traditional principles of method. To the reviewer, chapters 1, 6, 12, 25, 26, and 31 are among the most fruitful and are most free from confusion and dubious doctrines.

There is a partial dependence on authorities not today accounted experts, and too often the material has not been assimilated and organized by a careful analysis of the fundamental and technical problems at

issue. It may be too much to expect a technical mastery of the field in a book written with such a purpose, but for want of it the reader is sure at times to be led astray or to be confused. To be sure, the volume omits most moot points, and eliminates all discussion; but an implicit belief in the views presented can result in clarity only in case the views themselves are consistent. In the present state of our knowledge of genetic psychology, it is not remarkable that in the book at hand there is considerable confusion between different stages of development. Habit is frequently spoken of as the aim of education without reference to the distinction of stages, without an adequate concept of habit, and without notice of the limitations of the Sunday school. The motor factor is given a great place in the Sunday school, but one discovers that this implies an extension of that school and its closer correlation with the various week-day activities, or preparation for doing and imaginative doing are substituted for the real doing. The Sunday school teacher is committed to the five steps of the Herbartian method *in toto* at first, with stress on the value of induction and no mention of deduction. But the rigid formalism thus suggested, and so out of the question in the half hour of the Sunday school, quite disappears before the author's free and easy way of conceiving it. But this part of the book contains plenty of practical suggestions on the process and art of teaching, suggestions not without some basis in psychology; and it might be said that method on a logical basis is less vital to the needs of the Sunday school. Indeed the assumption of one, in apparently adopting the Herbartian method, that religion, morals, art and science are all to be taught by the same invariable or uniform method, is open to grave question. Finally, it might rightly be asked of a book on religious pedagogy that it give more attention to the philosophy and psychology of religion in order to present a conception of religion and of the mode of religious development. This side of the subject is not given the same prominence as are the general psychology and pedagogy. The fusion of religion with life is emphasized, but religion comes near to being identified with morality, and morality with habit.

E. L. NORTON.

School of Education, University of Illinois.

ANNA LOUISE STRONG. *The Psychology of Prayer*. (Chicago: University of Chicago Press. Pp. 122. 83c.).

In her booklet of seven sections the author maintains her theory of prayer as a form of the imaginative social process. It has for its end the construction of a wider self. Many of the so-called objective results of prayer are attained indirectly through the construction of a more confident self, through a better interpretation of the circumstances involved, or through subconscious activities in a variety of forms. Prayers for the sick have a therapeutic effect.

In this imaginative social process there arise simultaneously in consciousness two selves—the self of the *me* which represents a desire, and the self of the *alter* which represents the means of gratifying that desire. In the practice of this social relation between the *me* and the *alter* there are two tendencies—the æsthetic or contemplative, and the ethical or the practical. The former rests content in the emotional appreciation of the prayer experience itself, while the latter passes as soon as possible into action. The æsthetic form of prayer obtains its end by a surrender of the immediate desire, which results in peace of mind through a reliance on subconscious activities. In the ethical type of prayer the notion of a mighty helper, the unification of purpose, the dependence upon the more regularly efficient subconscious activities are important factors in reaching the desired end.

The question of the reality behind the *alter*, as also the question of the nature of the reality behind the *me* are problems for metaphysics and not for psychology. Both the *alter* and the *me* are real as contributing to the final result. Consciousness furnishes materials for an attempt to unify both selves. Some sort of dynamic unity is to be found in the *me* and in the *alter* since both originate in consciousness.

The author shows an intimate and a wide acquaintance with the prayer literature. Her treatment of the subject is, however, suggestive rather than exhaustive. It will prove a helpful contribution to a further study.

KARL STOLZ.

University of Iowa.



S. WEIR MITCHELL. *Motor Ataxia From Emotion*. (Journal of Nervous and Mental Diseases, May, 1909.)

Illustrating by a case of motor ataxia, Dr. Mitchell calls attention to the fact that many people experience a nervousness or peculiar motor ataxia when acting under observation. The act of signature, for example, is very often affected. He is surprised to find, upon inquiry "how many people there are who dislike to be under observation when signing a name." In older people this may, he thinks, be partly explained by the sense of failing powers. Others are perhaps hampered by the existence of a doubt, and the influence of emotion.

It seems to the reviewer that this subject has a close relation to childhood activities also, especially when accessory muscles are concerned. Are not children bothered and discouraged by the too close watching of adults?

WALTER R. MILES.

University of Iowa.

J. GONIN. *Un cas d'aphasie visuelle pure*. Archives de Psychologie, 9: October, 1909, 51-62.

A five-year old girl who had been struck repeatedly over the head with an axe-handle suffered total unconsciousness for 48 hours and for three days after recovery of consciousness exhibited Jacksonian epilepsy in the left arm, together with other signs of nervous disorder. The epileptic seizures yielded to medical treatment, but the child's gait remained for a time ataxic, and she was judged by the physicians who first treated her to be cortically blind, because, although the retina was in normal condition, she was unable to name any objects set before her.

More careful examination by Goniñ showed that the child suffered from left hemianopsia coupled with pure visual aphasia. If an object was presented upon the proper side of the visual field, she refused to name it or named it incorrectly, but if she were then given a series of names, one of which was correct, she invariably picked out the correct name and applied it to the object. The ability to name objects gradually improved and became virtually normal in a few weeks. Gonin suggests that cases may have occurred before in which a similarly mistaken diagnosis of blindness may have been due to visual aphasia.

The association of left hemianopsia with disturbance of the speech center is unusual: presumably here it was due to two-fold cortical injury, i. e., of the right visual and of the left speech center.

JOHN FRANCIS.

PROFESSOR DR. BUCHHOLZ. *Zeugenaussagen*. Archiv f. Kriminal-Anthropologie u. Kriminalistik, 35: October, 1909, 128-9.

The writer narrates briefly two incidents that illustrate the ease with which absolutely erroneous reports may be made with positive assurance of accuracy by a supposedly competent observer. In the first instance, the writer's 6-year old son, upon returning from a walk with his grandmother, said that while his grandmother was talking with another lady, his uncle had shaken hands with him and sent his regards to his mother. The child's grandmother emphatically denied that any such occurrence had taken place, asserted that she had not talked with anybody, that she had held the boy's hand all the time. and that they had not met his uncle. While the family was discussing the fallacies of children's testimony, the uncle appeared, corroborated the lad's story, and the grandmother, when the name was mentioned, recalled having spoken "for just a moment" with a lady friend.

In the second instance, the writer arranged to have a certain person simulate an attack of epilepsy before one of his classes. The person in question had thrown his jacket into a corner of the room, so the writer, during the simulated attack, picked it up and placed it under the supposed epileptic's head. After the 'demonstration' had been concluded, a student explained that *he* had foreseen the possibility of injury and had accordingly put the jacket under the epileptic's head. It required the united efforts of Professor Buchholz and other members of the class to convince the student that he had not really performed the act.

G. M. W.

CHARLES F. WINBIGLER, Ph.M. *Suggestion: Its Law and Application, or The Principle and Practice of Psycho-therapeutics*. (Washington, D. C.: Spencer A. Lewis Company, 1909.)

The scientific reader will sufficiently understand the character of this book when he is told that the only authorities to whom the author acknowledges indebtedness are Tuckey, Schofield, Grasset, Bramwell, Leavitt, Thomas J. Hudson, Quackenbos and W. W. Atkinson,—a list curiously compounded of good and bad, but most surprising in its omissions.

The author says his desire has been to be of service to his day and generation. Granted. And if the desire were enough to warrant the publication of such a book, nothing further need be said by the present reviewer. We need not raise the question whether the author has rendered any service to his day and generation by writing this book, but we should like to head off some of the evil he has done. Such a mixture of half truths, truths and unfounded statements can only confuse or lead astray the unscientific reader.

To begin with, the author has become a convert to the belief in telepathy which has recently gained a seemingly imposing array of adherents—men whose names are famous in *some* lines and who, on this account, are supposed to be final oracles in every line that they happen to turn to, that old and familiar fallacy understood by school boys at least ever since the days of Whately. Telepathy has not been proved (to say the least), yet our author in blissful peace assumes that telepathy is an established scientific fact and bases everything upon it.

The sub-conscious mind has, it is true, somewhat better sponsors among men of science, but even those who have made most use of this concept would never subscribe to the crass views of the unconscious mind set forth by our author.

The old saw that "Whom the gods would destroy, they first make mad" may be finished by the equally true sentiment: Whom they would make mad they first interest in the occult.

It tempts one to believe in the soul-evolution theory, when he sees how most of the men who attempt to deal with the "occult" climb down from their safe citadel of common sense and go plunging about in a pool of nonsense. Apparently, man has come up through an epoch of the blackest superstition and he cannot now look back at what he does not understand without having a reversion to that primitive state where puerile fancies take the place of virile facts.

Another wave of doctrine which has swept our author off his feet is "Suggestion." This commonplace fact has become for him the god of the occult world. It accomplishes all things, explains all things—even those that are too ridiculous to need an explanation, and what is still worse, even the common things that are well understood by the thoughtful, but happen not to be clear to our author. For example, he says that suggestion explains how a child of twelve that has ceased to grow begins to do so again when measured against a young growing sapling and told that he will grow as it does. "He watches the little tree and thinks about what was said and the subconscious mind catches

on to the suggestion, and the result follows in the child's growth" (p. 269).

The difficulty here, as so often, is an inadequate psychology. Had our author mastered the known psychological laws, he either would not have written his book or would have avoided the inanities with which it is filled. It would have saved him from the Christian Science twaddle of which he is guilty. Thus, on p. 303 we read: "Jealousy and condemnation, in various forms and degrees, are prolific producers of 'rheumatism' and its kind." One might multiply quotations of this sort *ad nauseam*.

Altogether, one finds no reason why the book should be read. All that is true in it has been much better and more briefly said by others.

H. H. GODDARD.

Vineland, N. J.

THOMAS R. LOUNSBURY. *English Spelling and Spelling Reform*. (New York and London: Harper & Brothers. 1909, Post 8vo. Pp. xiv + 357.)

If you do not believe in spelling reform, you are "an ignoramus, not to say idiot," and your "proclivities are violently asinine" (p. 7). Whatever you may have to say for yourself is mere "gabble"—"the chatter of the uninformed" (p. 81), "displaying the amplest possible ignorance" (p. 10), to parallel which "the annals of fatuity will in truth be searched in vain" (p. 59).

The foregoing sentences contain a fairly complete summary of Professor Lounsbury's book. It follows, of course, that the volume is likely to be of little use in the world, except perhaps in affording considerable malicious amusement to the opponents of the view which the author advocates.

For no amount of clever shrewishness will conceal the fact that there are at least two sides—and it may be three or four—to the question of revamping our spelling. That the present orthography is highly illogical and absurd is patent enough—and hardly needs to be maintained with such persistent rancor. That this irrationality is the cause of a certain waste on the part of learners is also perfectly clear. But several considerations remain. (1) The amount and seriousness of the waste is much disputed by those best able to get at the facts, namely, the teachers of children. (2) The feasibility of any change in this country and at this time is very uncertain. (3) The possibility of

effecting some improvement, being assured, the particular changes proposed by the Simplified Spelling Board are surely lawful matter of discussion. It does not seem necessary to go into any one of these questions in this connection; for Professor Lounsbury raises no points in regard to them which have not been made tolerably—if not intolerably—familiar to all through the activities of Mr. Carnegie's board of propaganda. But it is a matter, not of argument, but of simple fact, that the considerations named have had weight with men and women—teachers, physicians, lawyers, clergymen, publishers—who cannot in seriousness be described as grossly ignorant or unintelligent; and have been supported by arguments which may indeed be answerable, but which it is as inaccurate as it is discourteous to call “idiotic,” “fatuous,” or “asinine..”

The pity of the thing is that the present moment would have been the psychological one for the appearance of the right kind of book on this topic. The first fusillade of “bulletins” from Number 1, Madison Avenue has apparently been exhausted. The fury of the answering volleys of editorials and communications has also subsided. There remains, on the part of many thousands of intelligent and progressive people—including most of the teachers of the country, whom especially the reformers should wish to reach,—a certain amount of real interest. These people are not hungering for more polemics; they are not amenable to controversial bulldozing. But they would be glad, now that most of the smoke has cleared away, to get at the rights of this matter—to find out, if they could, what they ought to do about it, or, at any rate, what they ought to have their children taught. A succinct and dispassionate summary of the whole argument pro and con would, I believe, have had a wide reading, and might conceivably have contributed materially to the advancement of the movement which Professor Lounsbury has so much at heart.

But what does he expect to accomplish, or whom does he hope to conciliate or convince, by this long-winded orthographic scolding—these three hundred pages of rambling vituperation? This kind of writing was considered effective in the days of John Dennis, but its inadequacy to produce any results other than irritation is now so thoroughly recognized that any long piece of it seldom attains the imprint of a first-rate publisher. Any one not already committed body and soul to the cause of the Reform is likely to be so much put out by the continual tongue-lashing he receives that he will be unable to give the interspersed arguments the attention they would otherwise obtain.

C. M. McCONN.

University of Illinois.

ALEXANDER MEIKLEJOHN. *Competition in College*. Brown Alumni Monthly, 10: November, 1909, 75-78.

This article deals with the use of competition as an incentive in intellectual work. Though written from the standpoint of collegiate instruction, it discusses principles that apply equally well to work in the schools.

President Lowell, in discussing recently the aims of collegiate instruction, said: "Universities stand for the eternal worth of thought, for the pre-eminence of the prophet and the seer; but instead of being thrilled by the eager search for truth, our classes too often sit listless on the bench. It is not because the lecturer is dull, but because the pupils do not prize the end enough to relish the drudgery required for skill in any great pursuit, or indeed in any sport." He goes on to advocate the extension and intensification of the competitive element in college work, and asks whether by introducing into the field of study the spirit of competition which dominates and surrounds the gridiron, we cannot create the same attitude of patience, industry and devotion by which athletic victories may be achieved.

Dean Meiklejohn points out, however, certain defects in the analogy between scholastic and athletic competition. Thus, the elective system, by giving to each student a different group of studies, has made impossible any even or fair competition in the college as a whole. Again, as President Lowell himself has pointed out, "the athlete makes appeal to the imagination of his fellows not because he is engaged in competition, but *because he is representing his college*." On the other hand, the student who wins an intellectual prize is in the eyes of his fellows a good man, "but he is not, in the same sense as the athlete, *their man*."

Competition, then, may not be the only way, or even the best way, to improve the work of our students. The Princeton plan of bringing students and teacher into constant and intimate contact in dealing with the things of the mind is a line along which progress may be sought.

In general, thinks Meiklejohn, "we are far too timid and compromising in our preaching to the students that the college of their devotion is first of all a place of the mind. We hear in our colleges altogether too much preaching of character as the aim of instruction and altogether too little of the glories of intellectual activity and achievement."

Finally, a fundamental source of difficulty lies in the fact that "for the most part our boys come to us from a society in which scholarship is held in little regard, and they are preparing for careers in which intellectual interests are to play little part. It is the task of the American

college to exalt the intellectual values in a community whose values are very largely practical, not hostile to the scholar, but simply indifferent to him."

JOHN FRANCIS.

CHARLES W. ELIOT. *Education for Efficiency, and the New Definition of the Cultivated Man*. (Boston: Houghton Mifflin Company, 1909. Pp. VIII, 58. 35c.)

The two addresses which constitute this little volume will have permanent value in educational theory.

"By efficiency I mean effective power for work and service during a healthy and active life." In education for power and knowledge, he emphasizes the training of the senses and the care of the body, the habit of quick and concentrated attention, the power of consecutive thinking, the discernment of beauty and excellence, the lawful and productive use of liberty, the passion for truth, and the motive power of enthusiasm. "Education for efficiency must not be materialistic, prosaic, or utilitarian; it must be idealistic, humane, and passionate, or it will not win its goal."

"The cultivated man is to be a man of quick perceptions, broad sympathies, and wide affinities; responsive, but independent: self-reliant, but deferential; loving truth and candor, but also moderation and proportion; courageous, but gentle; not finished, but perfecting." To this end he lays special stress upon science and service, skill and labor, character, the power of literary appreciation and expression, knowledge of nature and of men, and the training of imagination.

C. E. S.

W. NOYES. *The Ethical Values of the Manual and Domestic Arts*. Proceedings of the Northern Illinois Teachers' Association, 1909. Pp. 6-17.

The manual-training movement in America has passed through three stages of development, and is now in a fourth stage. The first stage, the author tells us, was characterized by the "Russian" system, an attempt to abstract the processes common to a number of wood and

ironworking trades, and to teach these processes as processes. Except so far as, in an anticipatory way, it prepares one for social usefulness, it is distinctly non-social and non-ethical. The second stage is most closely identified with the "Swedish" or "Sloyd" system. This differed from the "Russian" in emphasizing certain social features of hand-work. It aimed to reestablish domestic industry in Sweden, as an offset to the influences of machinery and the factories. In a narrower sphere, it was intended to inculcate habits of neatness, accuracy, and carefulness, and a respect for labor. The third stage was initiated by the growing interest in the Arts and Crafts movement. This movement was, in its inception, ethical in its nature. As represented educationally in manual training, it revived some of the ideals of craftsmanship that characterized the mediæval guilds. Manual training, when dominated by these ideals, could scarcely escape impressing pupils with the fact that wealth is created by effort, and that the production of wealth is essentially a social act. The fourth stage, which the manual training movement is now entering, is very closely identified with industrial education, and it is here, the author believes, that the ethical value of manual training can be most richly realized. "No system of manual training . . . tacked on to an ethically barren school system can be pregnant with great volumes of virtue." When the school recognizes the industries in its curriculum, and when pupils are permitted to participate in these industries "for the sake of obtaining a growing social consciousness," then, the author assures us, manual training will come into its own as a means of moral culture.

W. C. B.

HENRY FISHER. *Psychology for Music Teachers*. (London: J. Curwen & Sons, Ltd., 1905. 3s.)

Although four years old, this book is here noticed because it is practically the best of its kind. It is not a fragmentary attempt to restate the elements of psychology, but a frank and scholarly statement of facts in music from the point of view of psychology.

Those who write applied psychology in other fields, here find an excellent point of view. In psychology of music, painting, architecture, business, etc., which has to be presented to people who do not know psychology, the aim should always be—not to present an outline of psychology but—to describe the facts in question from a psychological



point of view, with psychological insight, and in untechnical language. We can no more present psychology in a brief and handy outline, than we can present literature in that way.

C. E. S.

BELLE RAGNAR PARSONS. *Plays and Games for Indoors and Out*. (New York: A. S. Barnes and Company, 1909. Pp. xl, 215. \$1.50.

The aim of this excellent manual of "rhythmic activities correlated with the studies of the school program" is to infuse a thought content and a spirited play into the regular gymnastic drill. The child is led to act in playful imitation of the industrial, social, heroic, and historic life of man. The physical exercise is thus vitalized and may be a means for the development of the child's ethical and social nature as well as the body. When we realize that mind and body develop through play and that the chief realization of life, both in the child and in the adult, comes in the playful attitude, we realize that the reorganization of physical exercise such as is here given, is psychologically sound.

C. E. S.

C. W. CRAMPTON, M.D. *The Folk Dance Book*. (New York: A. S. Barnes and Company, 1909. Pp. x, 82 quarto. \$1.50.)

This book for the elementary school class room, play ground and gymnasium, compiled by the director of physical training in the New York Public Schools, places in the hands of the teachers of the public schools and play grounds the description and the appropriate music for the folk dances as now used in the course of study in New York City. The music is accompanied with full directions.

C. E. S.

H. CARR and J. B. WATSON, *Orientation in the White Rat*. *Journal of Comparative Neurology and Psychology*, 18: 1908, 27-44.

In a previous paper these authors advanced the conclusion that kinæsthetic and organic sensations play the most important part in the acquisition of labyrinth habits by the white rat. This conclusion was reached by means of experiments which excluded the use of the other

senses. In the present work a different method was used for the purpose of supplementing the evidence in favor of this conclusion, namely, conditions were imposed upon the rat which would tend to bring out clearly the importance of the kinæsthetic factor in habit-formation.

The maze was the same kind as that which had been previously used (the Hampton Court maze) and the rats were trained until they could run it automatically and without any mistakes. Then two kinds of experiments were tried. (1) The rats which had learned the maze perfectly starting always from the same given point, were set down in the maze at three other points in the true pathway, headed either in the right or the wrong direction, and their methods of orienting themselves were noted. (2) A section across the maze was cut out so that by its removal certain runways could be shortened although the turns and the alleys would retain the same relations to one another. The effect of this change on the rats' conduct and their methods of readjustment were observed. The animals were three normal males, two blind males, and three normal females. With one exception no differences were noted between the behavior of the blind and the normal animals. In the first series of experiments, the results show that although the situation was not wholly new to them, they did not orient themselves immediately but exhibited a number of random movements, ran back and forth in the runways, turned corners, and then, usually at certain distinctive points in the maze, seemed to pick up some familiar cue and finished the trip in the usual automatic fashion. The manner in which this cue is obtained, the authors consider, offers support to their theory that the automatic behavior of the rat in the maze is governed by internal (kinæsthetic) impulses, that these impulses are released when the animal experiences some of the characteristic motor situations which have helped to form the habit of running the maze correctly.

The second series of experiments gives additional support to this theory. When the runways were shortened by removing the middle section of the maze, marked disturbances in conduct occurred, such as running squarely into the ends of the shortened alleys, entering blind alleys, making slow, hesitating movements, nosing the walls, and making compensatory adjustments. It frequently took a longer time to eliminate these disturbances than it had taken the rat to learn the maze in the first place. After the shortened form of maze had been thoroughly learned the section was again inserted. Again disturbance in conduct occurred, taking the form chiefly of running into the wall at the places where the turns had been in the shortened form of the maze.

The results of these two experiments combined with those reported in the earlier paper form rather conclusive proof that the kinæsthetic factor in the adjustment of the rat to the maze is of fundamental importance.

In conclusion the authors contrast the behavior of the rat in the maze with that of human beings in a similar environment. Both can form habits of the kinæsthetic-motor type which become absolutely automatic. At this stage, the "movement to come" is released at the proper time by the kinæsthetic impulses aroused by the movement which has just been made. When the automatic series of movements has been disturbed, however, some other means must be utilized to effect a readjustment. These means in man are visual, auditory or tactual impulses, "distance sense cues." The rat, however, has apparently no such distance sense cues, but, according to the authors' hypothesis, it has the possibility of receiving kinæsthetic cues which function for control exactly as do visual cues in man. The rat receives this cue by traversing at random any "unit" of the maze. "The group of afferent impulses (kinæsthetic) which are aroused by traversing this unit releases the proper adjustment (i. e. the old movement which has been synergized on many past occasions with this particular group of impulses) and the automatic character of the movement is again restored. On this supposition man's kinæsthetic habits would differ from the rat's mainly in that whereas the former utilizes distance sense cues for reëstablishing automatic adjustments, the latter uses kinæsthetic cues."

ADA W. YERKES.

Cambridge, Mass.

W. W. CHARTERS. *Methods of Teaching*. (Chicago: Row, Peterson and Company, 1909. Pp. 255.)

It is usually difficult to foretell just what field an author will cover in a book entitled *Methods of Teaching*. One may find, for example, details of special methods in the various school subjects, a discussion of general methods from some particular standpoint, or a discourse on the principles of psychology as applied to education. Professor Charters' book is a text on the general method of teaching subject matter from the standpoint of the nature and origin of subject-matter and its relation to society in general, and to the child.

The general point of view is the functional one now dominant in philosophy. The author assumes that subject-matter has been organ-

ized and preserved to satisfy human needs, and that the subject-matter selected for the school is that which will satisfy the most fundamental and general needs. Also any unit of subject matter is best presented when the need for it is actually or potentially present in the experience of the pupils.

From this point of view, it becomes "necessary to discuss the methods of arousing the appropriate needs and the conditions under which they are found present, and to investigate the methods pursued by experience both in satisfying these needs, to the aid of which subject matter is invoked, and in securing the maximum degree of such satisfaction."

Attention is called to the desirability of distinguishing the aim of education from the standpoint of the pupil, of the teacher and of society in general, and of determining the relation of all of these to each other. The pupils' needs present the teacher's way of approach, and are the naïve beginnings out of which grows the aim as society sees it.

As for methods of teaching from the standpoint of the text, "*the aim of education is to assist the pupils to appreciate and control the values of life.*" A *value* as here used means anything worth while, *e. g.*, social efficiency, culture, a vigorous physique, making a living. By *control* of values is meant the ability to lay hold upon and secure them. It stands for efficiency. Hence the main problems to be discussed are (1) Subject-matter, the instruments available for the control of values; (2) Methods by which motives for acquiring control of these instruments are secured; (3) The process by which these instruments are acquired by the pupil; (4) The process by which the use of these instruments becomes easy and accurate. The first of these problems receives the attention of about 80 pages the second 70, the third 50 and the last 10.

A discussion of subject-matter is not practicable apart from a discussion of method, since the method of teaching a subject is the manner of development and organization of the subject-matter in the minds of individuals. Subject-matter has originated and been worked out where there has been a breakdown in old ways of acting.

There are different aspects of the function of subject-matter to be distinguished. First the intrinsic function, or the purpose for which the subject-matter is now used by the race, irrespective of school conditions; second, the indirect functions, including the disciplinary, the preparatory and the decorative. The first duty of the teacher is to determine the intrinsic function of each unit of subject-matter. Hav-

ing determined the function, the structure will likewise be determined, for a structure of subject-matter is an organization of parts for the purpose of fulfilling some function. Numerous excellent illustrations are here given of the function of particular units of subject-matter and of the fact that the structure is determined by the function. The same general subject-matter may of course have different functions with relatively different organizations.

As to the teaching of subject-matter, its great problems are getting the child to start work upon it, to organize it and apply it to the handling of other units of subject-matter. The child has plenty of energy, but this must be converted into a form in which it can be used to drive the processes of school instruction. This involves a knowledge of what things are considered of value by the pupils, how to find or create situations in which they are conscious of not having control of this value, and finally the subject-matter which is designed to give this control. Subject-matter may be of mediate or immediate interest. Where mediate interest is relied upon, the values desired by the child may be either generic (*e. g.*, desire for good standing, honesty), or specific (*e. g.*, the building of a box). The permanent and universal generic values are the ones to be developed and relied upon in the main. Chief among these is obedience. Many suggestive examples are given of methods of securing motives in regular school studies.

In the treatment of processes of acquiring subject-matter, the discussion of the relation of the logical organization to the psychological is of interest. If the recitation follows the logical outline of the day's lesson point by point, there is little opportunity for any original thinking by the pupil. The logical organization is arrived at in the summary and occurs whenever the development has gone far enough and there is danger of forgetting. In this connection the question is raised as to how far studies should be presented incidentally, and how far in formulated courses. In brief it seems that the incidental study should come first and continue until the pupils reach a point where formulation is necessary. In those studies in which a good deal of incidental work has already occurred, the logical order of presentation may be followed. For example in introducing some high school studies, such as physical geography, one might well start with the discussion of such questions as, "What makes wind blow?" "What are the prevailing winds here and why?" Such questions might be made to cover most of the important material and then the pupils might be turned loose upon the text with their rich content to help them out in reading it.

Finally the place of drill and application, the process by which the use of these instruments becomes easy and accurate, is indicated. Subject-matter has three uses,—cultural, instrumental and disciplinary. The cultural conception views it in relation to appreciation, the instrumental in relation to control, and the disciplinary in relation to skill in control.

Skill may be secured by drill and by application. Drill means repeating over and over in the same situation. Application means the use of a unit in a new situation. Learning principles is child's play compared with making wise applications. It is altogether unsafe to assume that because a pupil knows a principle he can apply it. In application alertness, strength of purpose and resourcefulness are all necessary. A plea is also made for more emphasis upon drill, as most of our pupils are decidedly lacking in readiness of information. The last two chapters contain some good suggestions on the assignment of lessons, and on the writing of lesson plans by teachers in training.

Altogether the treatment of the field covered is admirable. At first glance one is inclined to think that the scope of the book is not sufficiently extensive for a normal school or college text; but on second thought this criticism seems unwarranted. Teachers of general methods usually make the course too extensive for immature students at the expense of making it less intensive and practical. As to content, its newest and most commendable feature is its treatment of subject-matter as such.

In literary style the text is a model. It is clear, direct, forceful and logical throughout. Good summaries are given at the end of each chapter.

Its standpoint is fundamental and logically worked out, with due regard for the actual conditions of school work on the one hand, and in accordance with sound psychological principles on the other. While it is decidedly a text on general method rather than special methods, there is such an abundance and variety of concrete illustration as to lift the book entirely out of that class of text which is so highly abstract as to be largely unintelligible to the immature student of teaching.

B. R. SIMPSON.

Brooklyn Training School for Teachers.

LEWIS F. ANDERSON. *History of Common School Education*. (New York: Henry Holt and Company, 1909. Pp. xxi, 308.)

Since the days of Philobiblius so many texts on the history of education have appeared that there would seem to be little need of a new one unless it varies from the traditional lines of treatment. This variation is indicated in the second aim of this book, as set forth in the preface, "To give in outline an account of the science and art of common-school education that will aid the teachers in working out effective methods of instruction and organization." This purpose is unique and desirable; it makes the history of education a comparative study, substituting chronological for geographical areas, without sacrificing the other benefits that inhere in the subject.

In working out the book Doctor Anderson has realized his aims very satisfactorily. His presentation of the subject-matter and methods used in Roman schools (pp. 42-51, 53-66), of the medieval course of study (pp. 92-128), of courses of study and methods in English seventeenth century schools, (pp. 216-19), and his discussion of the Great Didactic of Comenius (pp. 232-37) are good types of the clear presentation of historical conditions that give a basis for intelligent comparison with present-day school work. I know of no general history of education that gives so good a treatment of the development of English schools. The range of topics treated is unusually broad for a book of this size; good judgment is shown in the selection of topics; and their treatment, though often brief, is clear and to the point.

This book will have its largest field of usefulness in normal schools and academies, though the discussions of the topics mentioned above will make it of value as a supplementary text in higher institutions.

ARVIN S. OLIN.

The University of Kansas.

E. DAVENPORT. *Education for Efficiency*. (Boston: D. C. Heath and Company, 1909. Pp. 190. \$1.)

This is a strong, timely, and thoughtful appeal for industrial education, especially with reference to agriculture. According to the subtopic it is "A discussion of certain phases of the problem of universal education with special reference to academic ideals and methods." The author is dean of the college of agriculture and director of the experiment station in the University of Illinois. The main arguments

of the book have been epitomized by the publishers essentially as follows:

American education aims to be universal: it must serve all the people in their needs for everyday life; it must touch and uplift not only all classes of men, but their industries as well. The purpose of the school is to make men ready for life: they must be educated for efficiency and service through vocational studies. Industrial education should be a part of the general school system, not separated in independent schools; to teach all subjects to all men in the same school is the great opportunity of America. To establish separate trade schools is temporarily easier, but it would be an inexcusable educational blunder, and a great handicap to future generations. To preserve a homogeneous people in America, to avoid class and trade lines, all should be educated under one general school system. The separate industrial school gives us a trained operative rather than an educated citizen. By grafting industrial education on our school system, we can turn out people who are both efficient and cultured. Industrial courses carried on side by side with academic work broaden those who go into professions as well as those who go into trades. The high school must add vocational courses or face a permanent decline under the onslaught of independent vocational schools. The proper blending of vocational education with the non-vocational courses is the way to keep the boy in school. One-fourth of the time of school children should be devoted to something distinctly vocational: utility does not lessen the educational value of a study. Occupations and industries are fast gaining their place in the universities; elementary education also is in this sense becoming universal to a sufficient degree. The weak place is the secondary school which touches the young people during their formative period, and should therefore offer them a real preparation for life. *Agriculture*, which engages the time and attention of half of our people, deserves an important place in the school studies. To this industry the author devotes four chapters, outlining a four-years' course, and explaining the practical method of procedure in introducing such courses into existing schools.

C. E. S.



## NOTES AND NEWS

As an outgrowth of the discussions on child psychology at the meetings of the Sixth International Congress of Psychology at Geneva, August, 1909, a provisional committee was appointed to consider the organization of an International Congress of Paidology, which should be devoted to the hygiene, anthropometry, physiology, psychology, pedagogy and sociology of children. The committee met in Paris, December 27, 1909, and formally adopted plans for such a congress. The purpose of the congress is to unite under one head the various local and national societies and congresses which are investigating the behavior of children. It was decided to establish a permanent international committee on which each of the principal countries of the world should have from 1 to 10 representatives, according to the interest manifested in the subject. To Germany, France and the United States are assigned the maximum number. Seventeen countries are already represented on this committee. Further information in regard to the organization of the congress may be obtained from the President of the International Committee, Dr. M. C. Schuyten, 141 Rue Bréderode, Antwerp, Belgium.

The schools of France are still disturbed by the religious situation. Some months ago the French bishops, archbishops and cardinals issued a pastoral letter condemning the principle of religious neutrality and practically forbidding parents to send their children to state schools. The schools were charged not merely with a lack of religious instruction but with teaching, by means of the use of certain text-books, a positive hatred of the church. The schoolmasters' federation retaliated by suing the bishops for defamation. The authors of the designated text-books brought suit for damages. The Catholic parents, on the other hand, formed associations to watch the schools and see that their children did not use the proscribed text-books. The children were encouraged to resist their teachers, to burn the books, or to boycott the schools. The school authorities ordered the teachers to use the text-books furnished or to give up their positions. Recently the courts dismissed the defamation suit, but the war will doubtless go merrily on until time has assuaged the bitterness caused by the separation of church and state.

Many European cities are offering courses in experimental pedagogy to their teachers. The city of Lyons, France, by the action of its municipal council, has established a course in "experimental psychology applied to education." The resolution of the council specifically states that the course is intended 1. For teachers; and 2. "For fathers and mothers, who ought to be, but are not always, the best educators, and who, in order to plan, carry on, and complete the education of their children, ought first of all and by all means to complete their own education." The work is under the competent direction of M. Nayrac, well known for his *Étude sur l'attention* and his *Étude psychologique de la femme*.

The League of National Handwriting (France), composed of medical men, oculists, orthopedists, and teachers, has recently made a report of an investigation on vertical and slant writing. The report favors slant writing on both orthopedic and ophthalmological grounds, and condemns vertical writing as slow, fatiguing, and predisposing to cramp.

The vacation courses for teachers offered at Cassel (Germany) last summer followed two main lines. On the one hand the psychology and pedagogy of the kindergarten was emphasized, and on the other the social aspect of education received much attention. The courses were well attended and gave great satisfaction. They will be continued next summer.

The St. Louis Teachers' College will reorganize its courses next year so that the students will spend the first year in the study of educational theory, following this by a half-year of practice teaching, and completing their course with a half-year of advanced theoretical work. It is believed that the study of theory subsequent to a period of practice will prove much more effective than the present arrangement of courses, in which the practice-teaching comes at the close of the two years' work. The Teachers' College has also instituted a series of extension courses and a voluntary summer session, both of which are very popular with the teachers of the city. The college is a part of the St. Louis public school system.

In order to guard against the abuses of an unlimited elective system and to secure a certain amount of concentration and distribution of studies, the Faculty of Arts and Sciences of Harvard University has adopted rules of the following general import, to go into effect with the

class entering in 1910: 1. Every student shall take at least six of his courses in some one department, and only two of these courses may be elementary in character. 2. All courses open to undergraduates shall be divided into four groups: (1) Language, Literature, Fine Arts, and Music; (2) Natural Sciences; (3) History, Political and Social Sciences; (4) Philosophy and Mathematics. Every student shall distribute at least six of his courses among the three general groups in which his chief work does not lie, and he shall take in each group not less than one course, and not less than three in any two groups.

The Columbia College Faculty has made two changes in the requirements for the B.A. degree. The first eliminates from the list of prescribed courses the elementary physics and chemistry which have heretofore been required of all candidates. This leaves mathematics as the only technical subject required. The second aims at securing greater concentration in electives, and prescribes that each student must complete three years of sequential study in each of two departments.

The Summer School bulletin of New York University announces that, in addition to the courses offered by the regular staff, the following courses in education will be given by visiting instructors. Prof. Walter Ballou Jacobs of Brown University will give courses in "Principles of Education" and "Hygiene of Education." Dr. Felix Arnold will discuss "School Organization" and give a seminar in "School Management." Edward L. Stevens, Associate City Superintendent of the New York City schools, will give three courses, entitled "Secondary School Problems," "The Phenomena of Adolescence and their Relation to School Work," and "Methods of Teaching Science and Languages in Secondary Schools." Dr. Mary Sutton Macy of the New York Medical College and Hospital for Women will lecture on "The Psycho-physiological Nature of the Child" and "The Pathological Child."

At the Summer Session of the University of Chicago Prof. Ellwood P. Cubberley of Leland Stanford Jr. University will give two courses, one on "State and Municipal School Organization" and the other on "Public Education in America." Prof. F. E. Farrington of the University of Texas will lecture on "French and American Schools", and on "Secondary-school Organization." Superintendent Calvin N. Kendall of Indianapolis will deliver a series of lectures on "The Course of Study in Elementary Schools."

The State of Minnesota, according to a recent report of the state auditor, is in a fortunate position in regard to school funds. In 1851, before the organization of the state government, congress set aside certain lands for school purposes. The fund from the sale of these lands now amounts to more than \$21,500,000 and over 3, 000,000 acres are still unsold. Part of this land lies in the iron district and at the contract royalty of 25 cents per ton it is estimated that \$250,000,000 will be realized from it within the next fifty years.

For the establishment of the George Peabody College for Teachers at Nashville, Tenn., the sum of \$1,000,000 has now been given by the board of trustees of the Peabody Fund for the Advancement of Education in the South. This gift was promised some time ago conditional on the granting by the state of Tennessee, the county of Davidson, and the city of Nashville of a sum approximating \$750,000.—*Science*.

In the *Metropolitan Magazine* for February, Professor Münsterberg, under the title "My Friends, the Spiritualists," publishes some theories and conclusions concerning Eusapia Palladino, together with several photographs of the medium, of her cabinet and levitating table, and of some of the best-known of her converts, Lombroso, Carrington and others. Three points of special interest are brought out: first, that Palladino is not the ignorant peasant woman of the newspaper paragraphers, but a woman of cleverness, if not of culture; second, that her performances rest upon unquestioned fraud; but third, that the fraud is quite possibly unconscious, or at least that it was originally unconscious,—a case of complex hysteria with splitting of the personality.

Professor A. O. Lovejoy, writing in the *Nation*, severely criticises the recent action of the trustees of the Carnegie Foundation for the Advancement of Teaching abolishing the "service" pensions. Professor Lovejoy maintains that the Foundation will be guilty of an act of bad faith unless it modifies its ruling so that those who have already made plans based upon its earlier promises will not be debarred from the privileges which, they had been led to understand, had been duly earned by their twenty-five years of service, irrespective of whether they were eligible under the age or disability clauses. From the advance copy of the Fourth Annual Report of the Foundation, published in *Science* February 25, it is clear that the task of playing the good fairy with Mr. Carnegie's millions is not a sinecure. President Pritchett now asserts that the fund is to be

administered solely in the interests of "teaching," and not in the interests of research or of the internal harmony of university life. If this policy is carried out consistently, the present practice of granting pensions to administrative officers while refusing them to teachers in the elementary and secondary schools attached as educational laboratories to the universities may come to be recognized as somewhat anomalous. Such discrimination places the development of the laboratory school under a severe handicap; and it may be safely contended that there is no department of the university that stands in greater need of development if one sincerely desires to advance "teaching."

The principal speaker of the midwinter meeting of the Illinois Schoolmasters' Club, Peoria, February 11 and 12, was Director C. H. Judd, of the University of Chicago. The general topic of the meeting was "Drill *versus* New Content." Professor Judd maintained that, through "an intelligent relating of the facts of experience," the child could gradually be trained habitually to take the scientific attitude toward the problems of life.

The Seminary of Paidology, organized last summer at Brussels under the able supervision of Mlle. Dr. I. Ioteyko, director of the psycho-physiological laboratory of the University of Brussels, is an innovation which is worthy of careful study and imitation in this country. Intensive studies were made of child anthropometry, psychometry, mental fatigue, measure of capacities, abnormal children, paidological technique, and collaboration between teacher and physician. An interesting feature of the session was the visit to the paidological laboratory of the city of Antwerp, directed by Dr. M. C. Schuyten. The Seminary aroused great enthusiasm and will be continued next summer.

At a recent meeting of the *Société pour l'étude psychologique de l'enfant* (Paris) M. Anfroy presented the results of extended experiments in comparative pedagogy to determine whether the daily memorizing of passages in prose and poetry has any effect on French composition. Two classes of the same age and the same ability in composition were selected, and one was trained in memorizing passages of literature for two months, while the other received no such training. Tests in composition were made before the practice, immediately after, and three months after. The experiment was repeated in another school. In both cases the classes trained in memorizing showed a decided improvement over the others in both form and content.

The third International Congress of School Hygiene will be held at Paris, August 2 to 7, 1910. The importance of the subject to which the congress pertains, and the interest manifested in the first congress held at Nuremberg in April, 1904, and in the second of the series held at London in August, 1907, justify the belief that the forthcoming congress will be largely attended, and that its deliberations will materially advance the efforts for the improved hygienic conditions of schools and the physical well-being of school children.—*Science*.

Dr. George P. Brown, founder and for many years editor of "School and Home Education," died at Bloomington, Ill., February 1, 1910. Dr. Brown was one of the most influential educational editors in the country, and through his journal did a great deal to stimulate the discussion of educational problems in a philosophical spirit.

We regret to note the death of one of our collaborators, Dr. J. A. Bergström, professor of pedagogy at Leland Stanford University, formerly director of the psychological laboratory of the University of Indiana, on February 28 at the age of forty-two years. Professor Bergström was the inventor of a number of psychometric instruments, the author of many psychological articles, and the translator of Kotelmann's "School Hygiene." His death is a loss to experimental pedagogy in America.

Dr. Lewis M. Terman of the Los Angeles Normal School has been appointed to a position in the Department of Education, Leland Stanford University. It is understood that Dr. Terman will have charge of the courses formerly given by Professor Bergström.

Professor V. A. C. Henmon, dean of the College of Letters and Science at the University of Colorado, has been made professor of educational psychology at the University of Wisconsin.

Professor George Drayton Strayer, of Teachers' College, has been promoted to the chair of American school administration. A new professorship will be established to cover the field of organization and administration of foreign school systems.

Dr. Harvey A. Peterson (Ph.D., Chicago) is an appointee in the department of psychology at the Illinois State Normal University, Normal, Illinois.

Dr. David P. Barrows has been made a member of the Department of Education at the University of California. Dr. Barrows was formerly Commissioner of Education in the Philippines.

Dr. Hugo Münsterberg, professor of psychology at Harvard University, has been appointed exchange professor at Berlin for the year 1910-'11. Professor Münsterberg has been requested by the German Government to organize in Berlin an academic institute which will foster the cultural relations between Germany and foreign countries.

Mr. Frank M. Leavitt, head of the department of manual training in the Boston city schools, has been appointed associate professor of industrial education in the School of Education at the University of Chicago. Mr. Leavitt was a student and later an instructor in the Massachusetts Institute of Technology.

Mr. Frederick Bonser, now of the McComb Illinois State Normal School, has been appointed assistant professor of industrial education at Teachers College, Columbia University.

Dr. Ernst Meumann, of Halle, has been called to the chair of philosophy at Leipzig, vacant through the death of Professor Max Heinze.—*Science.*

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# THE EFFECT OF PRACTISE UPON THE RANGE OF VISUAL ATTENTION AND OF VISUAL APPREHENSION.<sup>1</sup>

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## SUMMARY.

Two sets of experiments were conducted to determine the effect of practise upon quick visual perception, with special reference to the usefulness of specific "exercises in mind-training," such as have been recommended by Miss Aiken.

In the first set of experiments (range of attention), 5, 6 and 7-place series of isolated letters were exposed for 0.08 sec. with a tachistoscope. The observers were six college students. The quantitative results are, in general, those of other investigators in this field. The average limit of the range of attention is between 4 and 5 impressions: there are but slight individual differences: the longer series admit of a somewhat higher average performance, particularly when grouping can be employed: practise has but a very slight effect, which is easily explicable in terms of habituation to the experimental conditions and of development of the 'trick' of grouping. Range of attention, itself, is, so far as one can see, not affected by practise.

In the second set of experiments (range of apprehension), groups of dots, pictures, drawings, nonsense syllables, and stanzas of poetry were exposed for 3 sec. with the tachistoscope, and collocations of 10 objects were exposed without instrumental aid for 6 sec. The observers were three adults. With nonsense material, the range was but slightly

<sup>1</sup>A brief account of these experiments was presented at the meeting of Section L of the American Association for the Advancement of Science, at Chicago, 1907, and a summary appeared in *Science*, 27: 1908, 526. It was the author's intention to withhold publication until the tests could be repeated with school children. As circumstances have conspired to render this impossible, the results are now published with the hope that other investigators may undertake similar tests with children.

greater than with the short exposures: with sense of material, the range was increased on account of the possibility of more effective assimilation and grouping. Individual differences are so striking and so specific as to negative the notion of a general ability to apprehend, or even of a general ability to apprehend visually. The effect of practise, as before, is negligible when adaptation and assimilative devices are eliminated. A qualitative analysis shows that performance is conditioned by numerous factors, of which the most important are: native capacity, degree of attention, specific capacity for given types of material, ease of assimilation of the material shown, 'obstruction' or distraction, ideal type, voluntary restriction of observation, and grouping

#### PURPOSE OF THE OBSERVATION.

In 1896, Miss Catherine Aiken published an account of certain exercises, which she conducted with her pupils at a private school for girls at Stamford, Connecticut, for the purpose of mental training, particularly of training in the concentration of attention.<sup>2</sup> The results cited in this book are so extraordinary as to challenge attention both from psychologists and educators, for if it be possible, by devoting ten or fifteen minutes daily to simple exercises, to accomplish the results which are claimed,<sup>3</sup> it would appear to be incumbent upon all teachers to institute such exercises and to regard them as a very essential part of schoolroom training. If, on the other hand, Miss Aiken's results cannot be duplicated,

<sup>2</sup>CATHERINE AIKEN, *Method of mind-training: concentrated attention and memory*. New York, 1896. Pp. 107. For supplementary exercises, see her *Exercises in mind-training*. New York. 1899. Pp. 121.

<sup>3</sup>A single example, drawn at random, will suffice. There were placed upon a revolving blackboard in vertical column, the following numbers: 230, 729, 11, 36, 40000, 16, 40. By rotating the board, these were exposed for 3 seconds only; the pupils were then asked but once to multiply the first number by 2, to extract the cube root of the second, to square the third, to extract the square root of the fourth, to divide the fifth by 2, to multiply the sixth by 24, and to divide the seventh by 4, and then to repeat the changed column, which they did as follows: 460, 9, 121, 6, 20000, 384, 10 (pp. 30-31).

From correspondence with some of Miss Aiken's pupils, I infer that it was her class as a whole, and not any single pupil, that was able to accomplish such a feat. Even so, the performance is amazing.

it is equally important to establish this fact and then, if possible, to find out the cause of the discrepancy.

The experiments which follow were undertaken, therefore, with the intent to carry out, under laboratory conditions, exercises like those used by Miss Aiken and to measure the extent, and to analyze the nature, of the improvement that appeared. It may be admitted at the outset that the negative outcome of these experiments is not entirely conclusive; it may be objected that practise was not sufficiently long; it may be objected that our observers were adults, and that the outcome would have been essentially modified had our tests been applied to children. But neither of these objections seems to us of great moment; we feel that our observers had reached their maximal efficiency, and we are unable to believe that children could be brought to exhibit a range of apprehension so markedly superior to that of competent and well-trained university students and instructors.

Our experiments fall naturally into two groups: (1) Tests with tachistoscope exposures, so brief as to preclude eye-movement or the roving of attention, and (2) tests with exposure of more complex objects for periods of 3, or of 6 sec. The first set of experiments will be considered as tests of the range of attention, the second as tests of the range of apprehension. In both cases, the essential problem was to ascertain the effect of practise upon a small number of college students and adults.

#### PART I. THE RANGE OF ATTENTION.

APPARATUS.—All the short-exposure tests were conducted by means of a disc-tachistoscope<sup>4</sup> (Fig. 1). This consists essentially of a cardboard disc, 56 cm. in diameter, in which

<sup>4</sup>For a fuller description of this instrument, together with a discussion of the problems of tachistoscropy, see the writer's *Manual of Mental and Physical Tests*, Baltimore, 1910. The instrument is sold by C. H. Stoelting Co., 121 N. Green St., Chicago, Ill.

an adjustable sector has been arranged to expose, as the disc revolves, the stimulus-card placed just behind it. This disc is mounted upon one end of a horizontal axle. A meter-stick, equipped with two adjustable weights, is attached to the other end of the axle. By suitable adjustment of the weights, the disc can be rotated at the speed desired. Just

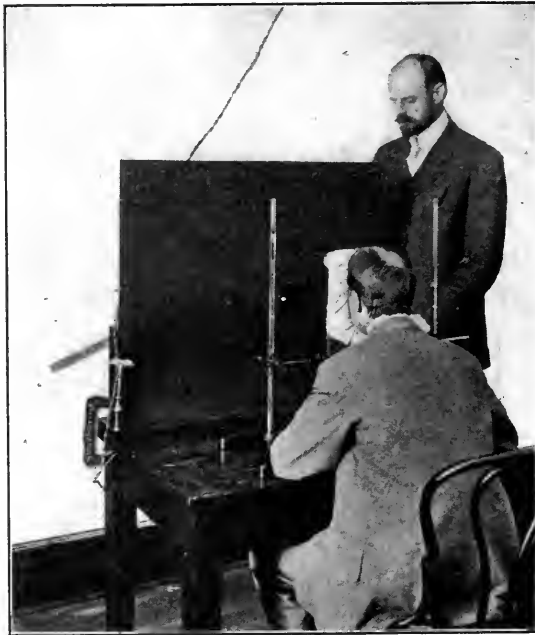


Fig. 1. DISC TACHISTOSCOPE.

before an exposure, the stick is supported upon a release-lever at the back of the instrument. In this position, the stimulus-card (9 x 9 cm., bearing one-half inch black letters) is hidden directly behind a fixation-card, but the fixation-card is visible through a square opening in the large cardboard screen that covers the front of the whole instrument, and through another square opening in the rotating

disc. When the release is pulled, the disc travels downward, the fixation-card is automatically lifted out of the way, and the notched sector of the disc exposes the stimulus-card for about 0.08 sec. The stimulus-card is illuminated from one side by a 16 C.P. frosted, tubular electric lamp. The observer's position is maintained by a headrest, as the cut illustrates.

The material used for these short exposures consisted in the main of 5, 6, and 7-place nonsense combinations of letters, *e. g.*, HFQSL, KTCMKZ, LSCLGYN.

METHOD.—Six college students, only two of whom had had training in psychological observation, served as observers. With two of these, the experiment was not carried far enough to warrant inference concerning practise, though their work, so far as it went, corroborated that of the four that are here mentioned. With these latter, tests were continued until it was evident that maximal practise had been attained. From 124 to 250 and more exposures were given to each observer. Five, six, and seven-place cards were given in irregular order, though the first trials were mainly confined to the shorter, and the final trials to the longer series. Introspective observations were recorded, but they were scanty and tended to become stereotyped. A warning "ready" signal was, of course, given about 1.5 sec. before each exposure.

The scoring was done by the simple method of crediting one unit for each letter correctly observed, and then deducting 0.5 for each error of transposition or insertion, *e. g.*, BVXTN or BXVTIN for BXVTN was scored 4.50.

RESULTS.—(1) As Table 1 shows, the *average number of letters* that can be grasped in a single exposure lies between 4 and 5 (4.82)—a result in close accord with previous tachistoscopic work.

(2) There are only slight *individual differences* in the work of different individuals.

TABLE I.

*Average Scores in the Exposure of Isolated Letters.*

Obs.	Number	5-Place Series	6-Place Series	7-Place Series	General Average
B.	124	4.85	5.09	5.25	5.06
E.	177	4.84	4.49	4.48	4.53
N.	249	4.74	4.92	5.38	4.97
T.	124	4.51	4.86	4.40	4.71
	674	4.74	4.84	4.88	4.82

(3) *Comparison of the series* shows that the 7-place series are somewhat more favorable than the 6-place, and these somewhat more favorable than the 5-place series in average scores. This is not, of course, because the longer series are easier, but because they offer opportunities for occasional scores of 6 or 7. This advantage slightly overweighs the disadvantage of greater complexity.

(4) The instances just cited in which 6 or 7 letters are reported correctly are almost invariably instances in which the presence of vowels permitted the *formation of syllables*, e. g., WAEGZME, KMDEMBH, etc.; in other words, these high scores are due to mental 'grouping of the elements exposed.

(5) Observers frequently assert that more has been seen than can be reported a moment later. That constituent elements of the stimulus may make an impression, and yet not a sufficiently strong impression to be named an instant later, is entirely probable; in fact, it can be demonstrated by asking the observed whether a given letter was exposed or not. It is possible that practise may augment the observer's capacity to hold these more fleeting and transient impressions, but we have no direct evidence to offer on this point.

(6) The *effect of practise* is indicated by the summarized data of Table 2, examination of which will suffice to convince the reader that attentive and effortful observation

through a series of from one to two hundred or more exposures has a curiously small effect upon the range of attention.

 TABLE II.<sup>5</sup>

*Effect of Practise in the Exposure of Isolated Letters.*

Observer.....	5-Place Series			6-Place Series				7-Place Series		
	B.	N.	T.	B.	E.	N.	T.	E.	N.	T.
First Period...	4.87	4.44	4.50	5.03	4.75	4.38	4.73	4.25	4.90	3.83
Middle Period	—	4.87	—	—	—	4.85	—	4.02	5.54	—
Last Period...	4.78	4.77	4.50	5.25	5.08	5.06	5.08	4.90	5.40	5.80

This small effect is easily explained. It is due almost entirely to two factors; first, to habituation to the experimental conditions; second, to the development of a device of forming groups of the letters and of using these groups, however arbitrary or inexact they might be, as bases for report. Habituation takes place quite rapidly in these experiments; a marked improvement is observable in the first sitting. Combination or grouping appears more clearly in the 6 and 7-place series, probably because these series afford more opportunities for its exercise. If these two factors were eliminated, the practise-effect would be negligible, if not altogether absent. In other words, adult observers very quickly reach a physiological limit of visual observation when the exposure is so restricted as to prohibit eye-movement and roving of attention.

#### PART II. THE RANGE OF APPREHENSION.<sup>6</sup>

##### 1. Three seconds' exposure with the tachistoscope.

APPARATUS.—The same tachistoscope was employed, but

<sup>5</sup>In explanation, it may be said that observers *B.*, *E.* and *T.* had less than 200 exposures, so that, to eliminate fluctuations due to chance variations in the material, their work is divided into two periods; observer *N.* gave a longer time to the work and it is instructive to divide his performance into three periods. In his case, the number of exposures represented is 249; over 300 were actually made, but the results of two sittings were unfortunately destroyed. Our notes taken at the time show, however, that the general results would not have been affected had these figures been included.

<sup>6</sup>A series of preliminary tests was conducted with the observers of Part I., using complex visual material, drawings, lines of poetry, columns of figures.

the fixation-card was removed; the device for holding the stimulus-card was replaced by a larger one suited for sheets of stiff paper, 5 x 8 inches; the weights and sector were adjusted for an exposure of 3 sec.

The material exposed was of five kinds: (a) dots, (b) pictures, (c) nonsense syllables, (d) drawings, (e) stanzas of poetry.

The dots were irregularly arranged groups of asterisks, numbering 6 to 20, placed by a typewriter within a space 35 mm. square in the center of the sheets of paper. The pictures consisted of drawings, cuts, lithographs, etc., cut from magazines, and they occupied, frequently, the full space of the blank, *i. e.*, 5 x 8 inches. The nonsense syllables, printed in a single horizontal row with a typewriter, were 8 to 10 in number, each being composed of 3 letters. The drawings, which were made with pen and ink, were for the most part meaningless combinations of lines or symbols, though a few gave some hint of meaning. The poetry, also typewritten, consisted of four line stanzas from Keats' *Isabella*.

METHOD.—The form of material to be shown was stated, and exposure for 3 sec. was made when the observer was thoroughly prepared, by fixation and attention, to receive it.

In reporting his observation, the observer made a rough pencil sketch of the dots, drawings, and often of the pictures, though these last were commonly described orally. He wrote or recited, at his will, the nonsense syllables and the poetry. The report was supplemented, as a rule, by a "quiz" on the part of the experimenter to determine whether details not reported had escaped observation, or had merely been neglected in the report. In the case of the pictures and drawings, the experimenter usually also confronted the observer with the card and asked him what details he had failed to note, what he had forgotten, or what he had misapprehended.

The performance of the observers was scored in the following manner: with the dot-cards, any mistake, even by one

etc., exposed without the aid of apparatus. These tests gave valuable hints for the arrangement of the final experiments, and threw light upon the mental processes concerned, but as they were not pushed far enough with any observer to warrant reliable inference as to the effect of practise, they will not be discussed further in this paper.



number, was considered as a failure; with the pictures and the drawings, the report was graded upon a scale of 10 points (for an adequate or complete report); with the non-sense syllables, one unit was credited for each letter correctly reported, but 0.5 was deducted for an error of transposition or insertion, whether of letters within syllables or of the syllables themselves; with poetry, the same method was followed, substituting words for letters.

OBSERVERS.—In these apprehension tests, the observers were Dr. H. A. Ruger, Professor of psychology at Colorado Springs College; Dr. L. A. Geissler, instructor in psychology at Cornell University, and Miss Helen Vermilyea, a school teacher with a small amount of psychological training.

## 2. Six seconds' exposure without the tachistoscope.

MATERIAL AND METHOD.—A small table was covered with a full-sized sheet of gray cardboard. Upon this as a background was placed a group of 10 objects (*e. g.*, pencil, spoon, tin box, leaf, key, postcard, pipe, wooden cube, pebble, watch), with the precaution to avoid combinations of obviously related objects, such as a pen and an ink-stand. Ten different objects were used for each test. A gray cloth covered the objects while the observer was taking his position. For the exposure, he stood directly in front of the table, and held a small sheet of cardboard before his eyes. A noiseless seconds' pendulum, off at one side, served the experimenter as a time-control, and he himself, after removing the cloth, took the observer's cardboard screen and, after a warning "ready," made the exposure by removing the screen for six seconds. The replacement of the screen terminated the exposure: the observer wheeled about, to turn his back to the table, and then immediately described (usually, also, sketched roughly) the objects on the table. Stress was laid primarily upon naming as many objects as possible, secondarily upon describing their details and their spatial relations.

One unit was credited upon the observer's score for each object correctly named.

These tests were made upon the same three observers just mentioned and were interspersed with the 3-sec. exposures. The experiments as a whole occupied some six weeks time.

RESULTS FOR BOTH TESTS OF APPREHENSION.—(1) The most striking quantitative result of these tests is the very small increase for certain kinds of material, in the number of items observed with the exposures of 3 and 6 sec. as compared with the exposures of 0.08 sec. (range of attention tests). Thus, for instance, with an exposure of 6 sec., the average number of objects named was 6.03, while, with an exposure only 1-75 as long, between 4 and 5 objects could be named. Similarly, only 3 to 4 nonsense syllables (10.15 letters) could be read correctly in 3 sec. On the other hand, the longer exposures materially increase the range of perception of sense-material which admits of quick assimilation: nearly 12 words were read in poetry as against the 4 to 6 limit in ordinary tachistoscropy. The advantage in this material is evidently due to the same factor discerned in the exceptional results with isolated letters, viz: grouping and combination into meaningful units.<sup>7</sup>

(2) *Individual differences* in quick apprehension are clearly indicated in Table 3. Thus, *V* excels in the estimation of dots and in reading poetry, but is the poorest of the observers in reading nonsense syllables, in reproducing drawings, or in describing pictures and objects. *G* excels in these last performances, but is inferior in reading poetry and in estimating dots.

These facts are important in connection with our study of the effect of practise, because they negative the idea of general ability in apprehension, or even of general ability in

<sup>7</sup>In the case of poetry, our observers felt that the limit of their performance was set simply by the amount that could be read during the exposure, whereas, even in the 6 sec. exposures, there is not time enough clearly to apprehend 10 disparate objects. The maximal correct reproduction of poetry was that of *R*, who, in 3 sec., read the first 19 words of the following:

"Were they unhappy then? It cannot be.

Too many tears for lovers have been shed.

Too many sighs give we to them in fee.

Too much of pity after they are dead."

visual apprehension: we may state only that a given individual excels in the attentive observation of pictures, of drawings,

TABLE III.

*Individual Differences in Visual Apprehension.*

	Dots	Pictures	Nonsense Syllables	Drawings	Poetry	Objects
G	33	6.96	10.9	8.65	9.42	7.10
R	46	6.89	10.7	6.42	12.92	5.57
V	80	4.40	8.9	3.70	13.21	5.50

NOTE.—The scoring is as follows: For dots, the percentage of exposures in which the dots were correctly counted. For pictures and for drawings, the average merit, as estimated on a score of 10. For nonsense syllables, the average number of letters, and for poetry, the average number of words correctly reproduced. For objects, the average number correctly described.

of words, or of certain kinds of objects, etc., not that he excels in all-around observation. Thus, *V*, it will be seen, is more than twice as efficient as *G* in the perception of groups of dots, but *G* is more than twice as efficient as *V* in the perception of drawings. These considerations make it still more improbable that a series of classroom exercises, like Miss Aiken's, will train and develop general capacity to attend.

(3) The *effect of practise* is shown in Table 4. Here, each period represents the average of three exposures, usually one daily for three days. Inspection of these data gives little warrant for the belief that systematic practise would enable an adult markedly to improve his ability for quick visual perception.

TABLE IV.

*Effect of Practise upon Visual Apprehension.*  
*Averages for Three Observers.*

Period . . . . .	1	2	3	4	5	6	7	8	9
Pictures . . . . .	6.6	4.9	5.9	6.3	6.9	6.9	6.5	5.5	
Nonsense . . . . .	9.3	10.6	8.4	10.8	11.7	10.6	10.4	8.9	9.2
Drawings . . . . .	6.6	6.3	5.0	5.6	5.0	7.7	6.5	6.6	5.7
Poetry . . . . .	10.7	11.5	11.3	10.8	13.0	12.5	13.0	11.7	
Objects . . . . .	5.6	6.3	5.9	6.0	5.9	6.5	6.4		

The tests with dots do not lend themselves readily to quantitative treatment. The seeming improvement with drawings during the sixth period was due to the use of one very easy drawing in that group. There is evidence of a slight improvement in reading poetry (amounting roughly to an increase of one word), but this may be attributed to increased familiarity with the peculiar style of the poem in use. If any improvement can be inferred in the case of the objects-test, it must amount to an increase, on the average, of less than one

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Just as in the short-exposure experiments, the slight practise-effect which can be discerned here is entirely explicable in terms of habituation to the experimental conditions, and of the development of grouping schemes or other devices of observation to be mentioned below. It is highly improbable that this period of practise trained the attention of our observers in such a manner as to enable them to surpass others in the quick observation of objects or incidents other than those used in the experiments.

(4) A *qualitative analysis* of the data secured in this experiment shows that the efficiency in visual apprehension exhibited by any individual is conditioned upon the following factors:

(a) *Native capacity* for concentrating attention in general. This factor we believe to have been unaffected by practise.

(b) The *degree of attention* given at the exposure. In theory, each exposure is accompanied by maximal attention: in practise, this condition is not always secured, and when it is not, the range is reduced.

(c) The *type of material* in use,—drawings, nonsense syllables, etc.,—has an effect upon the performance, and this effect varies in individual observers.

(d) The *ease of assimilation* of the particular stimulus in use obviously conditions performance: thus, an easy bit of poetry will increase the range of all observers; a drawing that

can be *named*, however fancifully, can on this account be held longer and reproduced better by most observers.

(e) *Obstruction or distraction.* Some detail in the object displayed, whether important or trivial, will often catch the observer's attention, interfere with his exploitation of the rest of the exposure-field, and thus measurably reduce his performance. For instance, a misprint in a line of poetry, or the presence of some unusual word, will induce most observers to reread the line, even at the obvious expense of their record.

(f) *Ideational type.* Visually minded observers hold drawings, pictures, and objects by their visual appearance, and are inclined to use visualization for the reproduction of at least portions of the nonsense material and poetry. Auditory-minded observers hold verbal material by auditory imagery: if decidedly auditory-minded, like the writer, they may also attempt to hold even pictures, drawings, and objects in auditory terms, by using verbal formulations as cues for recall.

(g) *Restriction.* Observers often intentionally restrict their range. Thus, in the exposure of nonsense syllables, it was early discovered by all the observers that, although by an effort, all ten of the syllables might be read over, only a poor reproduction (two or three at most) would result; if, however, attention were confined to the first four syllables, these could be read over twice and reproduced with some chance of accuracy. There may have been a similar intentional restriction of the range of apprehension to other types of material.

(h) *Grouping.* As noted above, apprehension is greatly facilitated by any scheme that permits of grouping the constituent elements in the field. The development of these grouping schemes is perhaps the most important single factor in practise-improvement, at least after the habituation of the preliminary trials. Thus, in the dot-tests, the collocation of irregularly arranged dots was by most observers, arbitrarily rearranged (subjectively) into two, three or sometimes four

groups of dots,—each group containing three to six dots. In a similar manner drawings were frequently split up into component elements and then recombined by a sort of analysis and synthesis. In auditory-minded observers, this process is usually accompanied by the application of verbal symbols as tags for recall, *e. g.*, “a rectangle, two peaks, and an arrow.” This analytic-grouping is commonly found to be more effective than the “steady stare” or “impression-of-the whole” method which observers are prone to use at first.

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Professor E. L. Thorndike, of Teachers College, Columbia University, recently delivered at the University of Illinois a series of five lectures on “Individual Differences and Their Causes.” The lectures discussed “Measurements of Individual Differences,” “The Influence of Sex,” “The Influence of Race,” “The Influence of Immediate Ancestry,” “The Influence of Training.”

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Dr. Clouston, Edinburgh, addressing a meeting of the Dundee Child Study Society, said he believed that, if they could find a way of improving the self-control of the coming generation, they would do more good than the House of Commons does in fifty years, and he believed it was a quality that could be improved if they went about it the right way. With the aid of school medical inspectors the teachers would now be able to apply general rules in specific ways, as at present it was one of the difficulties of the teaching profession that general rules of education could not apply to large groups of children. The ideal kind of education would be to sort out the children on certain natural rules, and subject each group to the kind of education and environment that suited its particular brain cell qualities. While that was still in the region of the ideal, teachers were at present endeavoring to individualize their children, and apply the rules of education to the individual instead of to the class in bulk.—*Educational Times*.

## THE COLLEGE LAGGARD.\*

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### SUMMARY.

A group of 127 delinquent college freshmen were studied statistically and by a questionnaire sent to them and to their high school principals. An excess of laggards is found among the men as compared with the women and among the fraternity as compared with the non-fraternity men. The personality of the student plays a more important role in scholarship than does the college environment. Moral traits, such as resistance to social and other distractions, seem more important than intellectual incapacity in explaining failure.

It is with the hope of stimulating interest in the topic of laggardism in college rather than with the idea of solving its problems that I am reporting in this paper a brief study of a group of 127 delinquents in the academic college at the University of Minnesota. Since this is a comparatively new field of investigation and the study has been mainly local, the results are suggestive rather than conclusive and the opinions decidedly tentative. From the point of view of this paper the important thing is to call attention to the college sphere as an inviting field in which to study the hopeful type of mental retardation. There is one manifest advantage in studying the college laggard. He is sufficiently intelligent and mature for his own introspections to be valid testimony.

The group which I studied was selected by a rule of the faculty which says that any student who receives conditions or failures in 60 per cent. of his work the first semester shall

\*Read before the North Central branch of the Psychological Association, November 27, 1909.

not be allowed to register for the second semester. During the past three years under this rule 127 freshmen would have been barred. This is a little less than 9 per cent. of the entire group of 1454 freshmen. In this larger group, I have compared the men and women, the fraternity and non-fraternity students, and the graduates of public and private schools to see what proportion reach the laggard list. I have also attempted to inquire more specifically about certain factors which might influence scholarship, by sending a questionnaire to the laggard students themselves and to the principals or superintendents under whom they graduated from high school. As might be expected this questionnaire met with a sorry fate among the ex-students, only about one in six replying to it. This shows conclusively that the views of the students themselves cannot be reached by the questionnaire method. The replies of 29 superintendents, about half of those written to, when taken together with the students' letters, gave me hints on at least 91 of the laggard group. I shall take up first the statistical inquiry.

The condition at Minnesota for studying sex differences is unusually favorable. During the last three years in the freshmen classes the sexes were about even in number, 627 men to 827 women. The men and women take about the same courses and recite to the same instructors. In comparing the probability of reaching the delinquent list, I find that the fraternity influence is such an important factor that the comparison can better be made between the groups of men and women who are not members of fraternities. Of the group of 482 non-fraternity men, 10.4 per cent. were on the laggard list, as compared with 6.2 per cent. of the group of 675 non-fraternity women. As a check on this method of comparing the sexes I have figured the percentages of delinquent hours of work for the non-fraternity groups in the freshman class for the first semester of the year 1907-8. Here again the men show at a decided disadvantage although not so much as when comparing the laggard lists. The percentages of delinquent hours are as 18.7 to 14.6. Roughly



then we might say that the chances of the first-year men not passing in their work were about 28 per cent. greater than for the women, and of their leaving college for delinquency 68 per cent. greater. There would, of course, be considerable variation in these percentages from year to year. Slosson has published\* the percentages suspended for delinquent scholarship from Stanford University for last year. Comparing the non-fraternity men and women for all classes who live under similar conditions in the college halls at Stanford, we find an even greater relative preponderance of men. The percentages are as 12.5 to 3.6.†

That this difference between the sexes is due to the instructors having favored the women in their grading does not seem to me to be likely. If this tendency to grade women higher were noticeable, we should expect it to be shown more prominently in letting women pass than in giving them the high marks when they do pass. The opposite is true so far as can be judged from the grades at Minnesota for one semester. The women were favored, if that interpretation were allowed, only two-thirds as much in escaping failure or condition as in obtaining the two highest grades, (the grades "excellent" and "good").

The excess of the laggards among the men accords with what has been found by Ayers in the elementary schools. He states from a comparison of the records of 14 or 15 cities that "there is 13 per cent. more retardation among boys than among girls and that there are 13 per cent. more repeaters among boys than among girls." This, with the fact of greater elimination of boys in the grades and high schools, leads Ayers to conclude that "our schools as they now exist

\*The Independent, April 1, 1909.

†At Chicago University Slosson found that from 1904 to 1908 in the Junior College 13.6 per cent of the men failed and 5.8 per cent of the women; 19.2 per cent of the men were conditioned and 11.2 per cent of the women. In 1906 43 per cent of all women and 19 per cent of all men received honorable mention on graduation; 20 per cent of the women and 9 per cent of the men received honors for special excellence in particular departments of the Senior College. Independent, Jan. 6, 1910, p. 33.

are better fitted to the needs and natures of the girl than of the boy pupils.'\* I am inclined to think that a similar reason accounts in part for the poorer showing of men in college. The work seems to them ill adapted to their future needs. The men, therefore, find college work less interesting than do women, they have less motive for studying, less desire to make good in that environment.

There may, however, be a native difference between men and women which is expressed in the hypothesis that the male type is more variable. If, then, we had a chance group, we should expect relatively more men to fail and to excel in any environment. Expressing this hypothesis as a mental trait, I suppose we might say that women may be more conservative, hence more conscientious in their work. If the sex difference in laggardism is due to variability, we should find relatively more men also at the other extreme in scholarships, unless some selective factor had disturbed the group. So far as the freshman grades for one semester are concerned, the men in the non-fraternity group show only about three-fourths the chance of the women of getting the two highest grades. I know of no high school data for testing how much selection disturbs the comparison of the sexes in college, but I suspect that the scholastically backward girl in high school is not so likely as the backward boy to go to college. It would also seem likely that outside inducements, such as business, would draw away the bright boy on graduation from high school rather than the bright girl. Until we have more information on these points we cannot conclude that the excessive failures of boys in college is due mainly to the poorer adaptation of the college to their needs.

Fraternity life is perhaps the most important outside influence on scholarship which can be inquired into statistically. Of 145 fraternity men in the freshman class at Minnesota during the past three years, 20 per cent. were on the laggard

\*L. P. Ayres, *Laggards in Our Schools*, New York: Charities Publication Committee, 1909, p. 158.

list. Of 152 sorority girls, only 3.3 per cent. were on this list. This indicates about twice as bad a condition among fraternity as among non-fraternity men and only a little more than half as bad a condition among fraternity as non-fraternity women. The favorable record of the sororities is almost entirely explained by selection since for two of these years all but one sorority waited until the second semester to initiate new members. The tabulated records for all the marks for one semester indicate similar conditions.\* There were relatively more delinquent hours among fraternity than non-fraternity men in the proportion of 30.3 to 18.7 and less among the women in the proportion of 7.9 to 14.6. In contrast with these differences, both the fraternity men and women seem to get about the same percentage of the two highest grades as do their non-fraternity competitors.

Whether the record of the fraternity men at Minnesota is typical I am not quite sure. At the University of Nebraska it is certainly quite different. The registrar informs me that at the mid-semester examinations last year there was a smaller proportion of delinquent hours among fraternity than among non-fraternity men, the ratio being as 13 to 22 per cent. On the other hand, at Stanford University the condition resembles that at Minnesota. According to Slosson, for the last ten years "in round numbers about half of the men who have been suspended belonged to fraternities, although they have numbered about a quarter of the masculine student body." The delinquency records of the sorority and non-sorority women for one year at Stanford show no marked difference. So far as Minnesota is

\*Hours work for the first semester, 1907-8.

Non-fraternity men, total hours, 2730; delinquent, 18.7 per cent.; excellent and good, 42.8.

Fraternity men, total hours, 577; delinquent 30.3 per cent.; excellent and good, 41.3 per cent.

Non-fraternity women, total hours, 3076; delinquent, 14.6 per cent.; excellent and good, 57.6 per cent.

Fraternity women, total hours, 647; delinquent, 7.9 per cent.; excellent and good, 53.5 per cent.

concerned the condition among the sororities has been accounted for by their greater care in selecting members, while the bad record of the men's fraternities is more likely due to the distracting influence of fraternity life than to the election of poorer students to these societies.\*

In the minds of high school authorities social and fraternity distractions are apparently the most serious environmental influence on scholarship in college. Among fifteen possible influences specifically considered and checked over by them in replying to the questionnaire, these two were most frequently referred to when accounting for the failure of particular graduates from their schools. If we count as one-half those cases where the factor was regarded as a secondary influence, and they were asked to check in this way, I find that among the 72 students for whom the questions were gone over there were 30 cases in which too much society was checked and  $18\frac{1}{2}$  in which fraternity life was checked. While the number of cases is small, I believe that it is significant that these influences were the most frequently mentioned among the long list of environmental factors inquired about.

The importance of outside distractions is probably also indicated by what might be called the handicap of wealth. The evidence for this is not at all conclusive, but several straws seem to point in the same direction. The Minneapolis high school which had a noticeably worse record than the others is in the wealthiest district in the city; the answers to the questionnaire gave "superabundance of spending money" as sixth among the environmental influences of failure; the percentage of students from private schools who get on the laggard list is about twice as great as from the public schools, it is as 15 to 8 per cent. Among 50 students on the laggard list, about whom I was able to obtain the in-

\*At Yale Slosson notes that 13.6 per cent of the members of the senior societies were elected to the honorary scholarship society, Phi Beta Kappa, as compared with 24.2 per cent of the other students. Independent, Feb. 4, 1909, p. 251.

formation, 39 were from families which needed to make no sacrifice to send their children to college. This proportion of four-fifths is, I am convinced, considerably larger than in the class as a whole.

If we try to distinguish the relative importance of personal and environmental factors as causes of failure in the college, one fact stands out prominently. Of 78 students on the laggard list about whom I received reports from the superintendents or principals, 47, or practically two-thirds, would not have been certified to the university for admission on the basis of their high school records if our new requirement had been in effect. This rule provides that in order to be admitted to college without examinations the students must have obtained a record in all subjects offered for entrance of at least 75 per cent., providing the passing mark was 65, or of 80 per cent. if the passing mark was 75. This means that two-thirds of those who became serious college laggards finished high school by a very narrow margin, they were already laggards in their high school environments, at least they were so backward in their studies that the principals have agreed hereafter not to recommend that class of students for admission to the university. Comparing this with Dearborn's results we find how surely personal characteristics affecting scholarship are established by the time of graduation from high school. Dearborn has shown that in a group of 472 students of the University of Wisconsin the Pearson coefficient of correlation of the standings in high school and the freshman year in college was  $+.80$ .\*

This evidence that personality rather than college environment is the main reason for failure brings us to the crux of the problem of college laggardism so far as psychology is concerned. What personal characteristics are most prominent in determining college failure? I feel justified in submitting only one distinction for your consideration. Are

\*W. F. Dearborn, *The Relative Standing of Pupils in the High School and in the University*, Bull. of Univ. of Wis.

they primarily intellectual or moral characteristics? If we take as intellectual functions the capacity to observe, to memorize, to imagine, and to reason, and as moral characteristics the organization and control of the emotions, desires, and impulses, one might expect that the college would have to do primarily with the former and would reject mainly those who are primarily dull. From the study of this laggard list I can find very little to justify such a conclusion and some reason to believe that where one lacks in intellect four are incapacitated by bad habits of control and disorganized characters. To begin with, I have at least 27 instances which indicate that the student has passed high school work creditably or showed reversal of form after leaving Minnesota. Here then are about a third of the 78 cases heard from in which it would be rather absurd to suppose intellectual incapacity.

Some of these letters are decidedly interesting. There are two laggards with a high school average of 90 per cent. Of one of these the principal says he was "an excellent student at all times." Another principal says of one of the laggards, she "did fine work while here." Another, in the opinion of the principal, had "a fine intellect." Of one it is said, "her record was very good with us." Another was said to be the best debater in the Twin City high schools. His principal writes of him, "He was as strong a student as we ever turned out, greatly interested in debate. . . . He has entered a school in Colorado and has the highest scholarship in his school." Another, whose parents are well able to pay his expenses, writes, "I am paying my own expenses at the University of Wisconsin and seem to be doing much better work." Here is another of whom the principal says, "His class work in all subjects was 85 per cent. or more. . . . He was a bright and a good student. . . . He has made good in the college which he entered the next year." Another when at high school was said to be "an inventive genius. He was devoted to wireless telegraphy and constructed the stations at the high school. He had the keenest analytic mind, did

all of his work in high school well, but needed constant advice, one of the finest boys we have had." While the others of the 27 have not as good high school records as these, they at least had creditable records.

In looking over the replies to the questionnaire with the point in mind of judging the importance of intellectual and moral incapacity I find that there are 86 students on the laggard list about whom it is possible to estimate on the basis of the opinion of themselves or their high school officers. My impression from these letters is that the cause of failure in 14 cases might be assigned to influences extrinsic to this problem such as health and necessary outside work; in 15 cases to intellectual incapacity, and in 57 to moral reasons such as lack of purpose, laziness, and inability to resist social, fraternity and other temptations which interfered with work. In other words, four times as many failures seemed to be referable to moral as intellectual factors. Doubtful cases I never classed in the moral group. At best this is only an attempt to tabulate opinions and for only a small group of people, but it is an impression gained from reading a rather unusual collection of letters which had been gathered before the idea of testing this point was conceived. In rather aimless wandering we sometimes hit upon striking facts which might escape us if our attention were fixed upon a definite goal. If this is such a fact it may have important implications for the training of laggards not only in college but in the high school and grades. We are at least coming to learn, as Ayers states, that "the long yearned-for royal road to learning is not always to be found through the surgeon's knife." I should like to suggest that the supplementary teacher in elementary and secondary schools or the college advisor probably has a much bigger problem than teaching the laggard his lesson. It is the problem of developing habits of application, habits of resistance to the distracting temptations of other activities. It is the general problem of interest and control. This, rather than physical defects or intellectual incapacity, may prove the main problem of scholastic retardation.

## THE QUALITIES OF MERIT IN TEACHERS

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The investigation that is summarized by this paper may be described as a preliminary inductive inquiry of a statistical nature into the qualities of merit in teachers. The word "preliminary" we use intentionally. The topic of the qualities of merit in teachers is so large and has been so little investigated (albeit frequently discussed) that a brief study like the present can do little more than to make a beginning and to raise questions.

Among the questions that arise upon investigating this topic are: What are the fundamental qualities of merit in teachers that should receive scientific and administrative recognition? How should, or might, a list of these qualities be accurately determined? What is the relative importance of these qualities, i. e., how should they be weighted in ranking teachers? How do these qualities correlate among themselves? How do they differ in elementary, high school and college teachers? To what uses might an accurate system of ranking teachers be put? How should the problem in hand be investigated, i. e., how should data of scientific value be obtained? To what extent do supervisory and administrative officers now explicitly rank their teachers on the basis of merit? What separate items of merit do they recognize? What practical use do they make of their rankings?

The study in hand aims to touch upon only a few of these questions and it does not pretend to exhaust any of them.



We decided, somewhat arbitrarily, to secure the following fourteen items of data from a number of representative schools.

1. The teachers by grades, numbered consecutively.
2. The highest certificate, diploma, or degree held by each teacher.
3. Experience in years.
4. General teaching merit.
5. Health.
6. Personal appearance.
7. Initiative or originality.
8. Strength of personality.
9. Teaching skill; method.
10. Control or ability to keep order.
11. Ability to carry out suggestions.
12. Accord between teacher and pupil.
13. Progressive scholarship or studiousness.
14. Social factor outside of school.

Beginning with the fourth item, the item of general merit, the instruction was given to rank the teachers by number in their order of merit, placing the best teacher first, the next best second, and so on through the list. It was explicitly stated not to assign grades anywhere, but to give relative position only. As the typical ward school contains only from eight to twelve teachers, we thought that this could be done quite readily. Cases of doubt we asked to be marked with a "D," but only a few collaborators took advantage of this.

The fourteen items mentioned, together with the necessary instructions, and explanations, we had mimeographed on paper of letter size. We placed each item at the head of a column and spread the items over two sheets, but this left ample room for the data requested. There was room for 25 names or numbers in each column without crowding.

The blanks thus prepared we submitted to the principals and supervisors of our acquaintance with the request that the data called for be furnished us. These officials responded with a fair degree of generosity and we are indeed appre-

ciative of their assistance. They gave us in all 39 returns. Of these 39, we have used 26 in preparing this report. Four of the other 13 were improperly filled out, four others came from high schools, and five contained less than five teachers, which was the smallest number that we thought it safe to include.

The data collected obviously admit of a large number of correlations. The different items in each return can not only be correlated with general merit, but also with each other, and as there are 12 correlatable items in each return, this permits of 66 separate correlations for each blank, or 1716 in all. While it might be worth while to make all these correlations, we made only 15 per sheet, or a total of about 390.

The correlations that we have made we have calculated by means of Woodworth's per cent. of displacement. This method is rapid and requires only the relative positions of the units in the items compared. It notes the amount of displacement or agreement between the two orders. The possible results vary from 0% to 100%. Two orders that are alike give a 0% of displacement, or perfect correlation, while two orders that are the reverse of each other give 100% of displacement, or complete antagonism. Fifty percent. of displacement would mean no correlation, while the percents from zero to fifty indicate decreasing amounts of correlation, and those from fifty to one hundred, increasing amounts of antagonism.\*

We have worked out a complete set of correlations with all the other items for general merit only, but we have also compared originality and the ability to carry out suggestions, and the strength of personality and accord, through all the papers, and we have made many other isolated correlations for sampling purposes.

The results of these correlations are condensed in the following table. This table gives the number of cases compared

\*For a fuller account of this method of calculating coefficients of correlation, see Ruediger, *The Field of Distinct Vision*, Science Presss, N. Y., pp. 37-39.

for each item, the range of the percents of displacement, the median percent of displacement, the average percent of displacement, and the M. V. and the P. E. calculated from the average. The last column gives the figure obtained by transmuting the average percent of displacement into the Pearson coefficient.

General Merit and	No. of Cases	Range	Med.	Av.	M. V.	P. E.	Pear- son
3. Experience ...	25	10-60	29	32	11	8	36
5. Health .....	18	6-67	50	48	10	7	4
6. Appearance...	24	10-61	44	40	10	7	20
7. Initiative.....	26	4-53	25	25	11	8	50
8. Personality....	26	0-70	25	27	13	11	46
9. Teaching Skill	26	0-70	17	23	15	13	54
10. Order.....	25	0-100	22	22	12	11	56
11. Following Suggestions	24	0-50	25	29	10	10	42
12. Accord.....	26	0-60	33	31	10	10	38
13. Studiousness..	24	0-53	30	28	12	11	44
14. Social Factor..	23	10-66	36	36	11	7	28
7. Compared with 11	24	0-77	30	31	14	10	38
8. Compared { with 12	24	7-60	33	32	10	8	36

Both the M. V.'s, which vary from 10-15, and the P. E.'s, which vary from 7-13, make evident the fact that there was little central tendency shown in any of the correlations. The averages themselves vary from 22 to 48, with an average of the averages of 31. The medians are in close correspondence with the averages throughout, diverging more than four points in only one case. Positive correlations of medium degree are evident in all cases except one, or perhaps two. The percents of displacement between general merit and personal appearance show a median of 44 and an average of 40, with a P. E. of 7. This leaves a positive correlation of a very slight amount at best. The lowest correlation obtained exists between health and general merit, the average and the median being respectively 48 and 50. It should be said, however, that the figures in this item are the most un-

reliable of the entire table. Only 18 out of the 26 supervisors supplied the data for health, and a number of the others expressed doubt as to theirs. The difficulty appears to be that the health of teachers, and of others as well, is not readily judged on the basis of anything short of a medical examination.

The highest correlations are found with teaching skill and with the ability to keep order, the medians and the averages being respectively 17 and 23, and 22 and 22. This may indicate that these items are the most important ones for successful teaching in the grades and that they should be given the greatest weight by supervisors in judging teachers.

The positive correlation between length of service and general merit is significant. The correlation is indicated by several other comparisons that we have made. The teaching experience of the 204 teachers for whom data were supplied under this head ranged from a fraction of a year to 34 years, with an average of 10 and a median of 8; 25% had taught less than five years, while 26% had taught over 14 years. The average and the median number of years taught by the teachers ranked first were respectively 14 and 10.5 years, and for those ranked second, 12 and 10.5 years. No teacher ranked either first or second had taught less than 5 years, and only 4% had taught more than 25 years. The average number of years taught by those ranked lowest was 8 years, and by those ranked second lowest, 9 years. The medians for these were respectively 4.5 and 6 years. When the two oldest teachers are removed from the lowest group, the average drops to 6 years, and when the one oldest is removed from the second lowest group, the average drops to 8 years. These three teachers had taught respectively 24, 30, and 32 years; 70% of the teachers in the first rank, 60% of those in the second rank, 40% of those in the second lowest rank, and only 30% of those in the lowest had taught 10 years or more. This indicates either that teachers keep on improving and passing to higher ranks for at least 10 years, or that the poorer teachers are gradually eliminated from the serv-

ice. Both factors may play a part. From the figures as a whole one may infer that a teacher in the grades reaches first-class efficiency in about 5 years, that he maintains this efficiency for about 20 years, and that after about 25 years of service he begins to decline.

The distribution of the good and the poor teachers among the various grades is interesting, although not unexpected; 28% of the teachers ranked first and second were teaching in the first grade and 19% in the eighth, a total of 47% in these two grades. Taking the first and second, and the seventh and eighth grades together, we found in them 69% of the best teachers, leaving only 31% to be distributed among the other four grades. The poor teachers are somewhat more evenly distributed. Regarding the two lowest groups as one, we found 57% in the four intermediate grades, as against 43% in the four extreme grades. The fourth and sixth grades together contained 38% of the poor teachers.

The distribution of the salaries appears to correspond closely with the distribution of teaching merit. We obtained the salary schedules in only nine systems, which is too small a number upon which to base any sweeping conclusions. Four out of these nine paid equal salaries to all their teachers, but, beginning with the first grade, the average salaries per month in the other five systems were respectively \$70, \$62, \$61, \$58, \$63, \$64, \$73, and \$77. They made a saddle-back corresponding to that made by the distribution of the best teachers.

The second item of information that we secured pertained to the preparation of the teachers. It called for the highest certificate, diploma, or degree held. Data under this head were given for 196 teachers; 47% of these were normal school graduates, 36% were teaching on certificates, 9% held college degrees, 6% were high school graduates merely, and 2% were trained as kindergartners. Basing our percentages on the numbers in each group, we found that 28% of the normal graduates occupied first and second rank, that 21% of the certificated teachers occupied these ranks, that 17%

of the college graduates did, and that no mere high school graduates or kindergartners occupied these ranks. The percentages in the two lowest ranks were distributed in a reverse manner; 16% of the normal graduates were found here, 21% of the certificated teachers, 36% of the high school graduates, 44% of the college graduates, and 50% of the kindergartners. In regard to the kindergartners it should be noted that their number in our lists was too small to give reliable results.

The normal graduates are clearly in the lead as successful teachers in the grades, and this advantage may be owing entirely to the training that they have received. They comprise the only one of our groups that has been formally trained for grade teaching. College graduates apparently do not make an enviable record as grade teachers, and the same may be said of people with only a high school preparation. The main cause of this is no doubt the factor of training, but with the college graduates the factor of selection very likely also plays a part. The better college graduates as a rule seek and obtain high school positions, leaving the poorer ones to accept positions in the grades.

A word should be said about the reliability of our data. That they possess some reliability is indicated by the consistent manner in which the various results hang together internally, and by the way they bear out the conclusions of common experience. But their amount should unquestionably be greatly increased,—a task hampered chiefly by the feeble spirit of coöperation among supervising officers,—and the rankings should be made by recognized experts throughout. If possible, too, each corps of teachers should be ranked by two or more experts. We had but one corps ranked, independently, by two people and in these two rankings there is considerable divergence. The average displacement between them is 25%. It also happened that one of the writers ranked one corps twice. He did this without knowledge and only later discovered the fact in the records. In these two the average displacement was only 14%.

# MEASUREMENTS OF THE PHYSICAL GROWTH OF TWO CHILDREN.

IRVING KING.

*University of Iowa.*

For some time I have felt that our knowledge of the physical growth of the child is seriously defective in that we have few if any systematic measurements of the development of the body as a whole and in parts. Furthermore most of the physical measurements that have been taken have been of more or less large groups of children, different groups for different ages, and the average measure for each age has been taken as the standard for that age. On this basis the relative and absolute increases of different years and periods have been computed. It is possible that all the supposed facts thus brought to light, except those of the most general character, may be quite spurious, on account of the great individual differences which may exist in the subjects. On account of these differences it may be that the variations within a group of a given age are such as to completely obliterate all the actual peculiarities of the curve of growth.

In view of these things it is easy to see that there is a need for systematic measurements of individual children taken at regular intervals for several years. It would be important also that such a series of observations begin at birth and continue until maturity. Manifestly it is only with data of this character that we can hope to reach any definite conclusions as to the nature of correlations between mental and physical development. Only by the examination of such individual records can we hope to arrive at any conclusions regarding the presence and relationships of rhythms of growth and retardation.

Having these things more or less in mind, I have attempted to take regular measurements of two brothers. The initial measurements were, in some cases, taken at birth and in others at the end of the first, second and third months. Height and weight were measured and also the limbs as a whole as well as their parts. Various measurements of the head were also attempted. The data here presented, except in the case of weight and the head measures, relate only to the increase in length. I attempted at first to measure the increase in the circumference of the different portions of the limbs and of the body, but as the subjects were very fat babies the figures thus obtained seemed to have no permanent or even definite significance for the general problem of growth.

The apparatus used consisted of ordinary spring scales for determining the weight, non-stretchable tape lines for the head measures, a centimeter stick and yard-stick for the height and limbs, and callipers for taking the length and breadth of the head.

The measures were taken less regularly with the first child. (See chart 1.) They were, however, carefully made and extend from the end of the first month until the present time (January, 1910), a period of six years and four months. In the case of the second child (Chart II) the measurements were more frequent and regular and cover a period of three years and four months. The first boy was born September 24th and the second three years later, September 20th. These dates are given that the reader may take into account the time of year in the examination of the various fluctuations exhibited by the curves. Whether this has had an influence upon the rate of growth I am not prepared to say. The possibility of seasonal variations should, however, be kept in mind. Both boys have apparently been normal in all respects and have at no time had serious or protracted sickness. Their only ailments have been occasional light colds and equally light attacks of measles.



The following is a brief statement of the method followed: I attempted to take as carefully as possible the weight (always nude), height in bare feet, length of entire leg, of the thigh, of the portion below the knee, of the entire arm, of the humerus, of the forearm to the end of the thumb. The head was also measured as follows: First, circumference; then from a point at the top of the joining of the ear with the head (1) over the brow, (2) at the hair-line (this is doubtless a varying point in different children, but in a given child it is sufficiently fixed for this purpose. It was chosen because it was in these cases conspicuously depressed at birth, a condition more or less true of all babies, I believe); (3) one inch back of the hair-line, (4) vertically over the head from the same points at the joining of the ears with the head and (5) similarly at the crown. In the case of the first child only the circumference of the head and numbers (2) and (4) of the last named measurements were taken. I also attempted to measure the increase in the back of the head, but found it impossible to do so with any approach to accuracy. The length and breadth of the head were taken in the usual way with suitable callipers and the cephalic index computed therefrom is given in the accompanying charts. It will be noted that this exhibits some interesting fluctuations in both cases. In connection with this data it will be of interest to know that the cephalic index of one of the parents is 78.8 and of the other 81.8. Due precautions were taken to make all these head measurements as much as possible underneath the hair, and I do not believe that changes in the quantity of hair are a source of serious error in the data here presented.

The following explanation of the periods into which the charts are divided should be here noted.

- I. Pre-grasping period to the 4th month.
- II. Development of grasping 4th to 6th month.
- III. Movements preliminary to creeping 6th to 10th month (Chart I).  
6th to 8th month (Chart II).
- IV. Creeping and walking 10th to 17th month (Chart I).  
8th to 18th month (Chart II).

V. Preliminary talking period 17th to 24th month.

VI. Rapid development of speech 3rd year.

Questioning, drawing, collecting interests strong in 4th to 6th years.

The fundamental difficulty in taking such measurements is that of getting perfectly fixed points from which to start. In the case of the leg there is a crease in the crotch where the leg joins the body that seemed to be a fairly constant point from which to measure. The distance from this to the extremity of the heel was taken as the length of the leg, the thigh being separated from the lower part of the leg by a crease in the skin under the knee which seemed to be constant. Similar creases in the skin were found in the arm pit and under the elbow. The distances from these creases to the end of the thumb were taken. Some persons may object that these points being only surface ones are too unstable to afford accurate determination of growth. However, I do not see how any greater accuracy would have been obtained by attempting to measure from points on the bones that would have had to be located superficially through a to measure the distances between such points by means of considerable layer of fat. In fact, the attempt was made callipers, and it was found that the possibilities of error were greater than in the method adopted. In every case the measure was taken a number of times until it seemed that it had been obtained as accurately as it could be.

Considerable difficulty was experienced in obtaining accurate head measurements, as the tape line slips easily on the head of a squirming baby, and one feels the need of more than two hands in the process. Since the taking of these, a simple apparatus has been devised for holding the tape in position at the ears while the different dimensions from the brow to the back of the head are taken.

The presumption of a fair degree of accuracy in all the measurements is supported by the fact that, as shown graphically in the charts, there were about the same accelerations and retardations in the percentage of increase of the measurements in which there was a very slight possibility of

error; e. g., in the case of weight, height, circumference of head and cephalic index, as in those in which the possibility of error was great.

TABLE I.

(Initial measurements upon which Chart I is computed.)

Weight,	10 lbs. at birth.			
Height,	20½ inches at birth.			
Circumference head,	15¾	"	on 51st day.	
Vertical over head,	8¾	"	"	"
Forehead at hair-line,	9¼	"	in 14th week.	
Entire leg,	8¾	"	"	"
Thigh,	3⅛	"	"	"
Heel to knee,	5⅝	"	"	"
Entire arm	8⅞	"	"	"
Humerus,	2¾	"	20th	"
Forearm,	6¾	"	"	"

TABLE II.

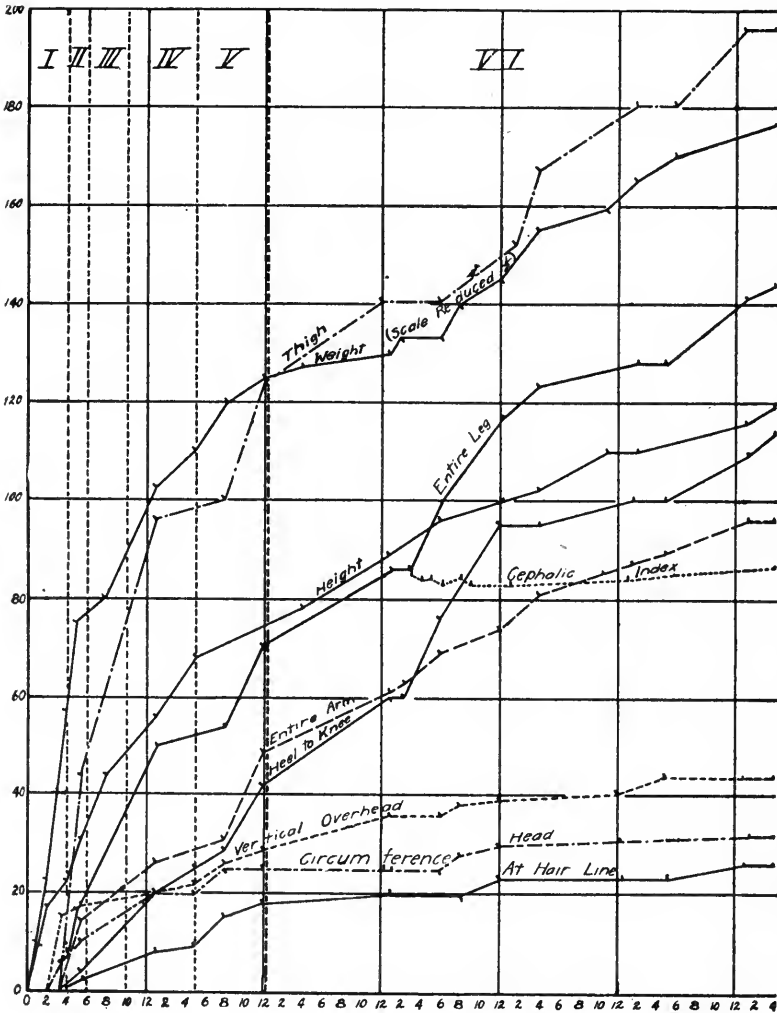
(Initial measurements upon which Chart II is computed.)

Weight,	10 lbs. at birth.			
Height,	22½ inches	end of	4th week.	
Circumference of head,	43 c m	"	"	11th "
Brow at protuberance over eyes,	23 c m	"	"	" "
Brow at hair-line,	24 c m	"	"	" "
One inch back of hair-line,	24 c m	"	"	" "
Vertical over head,	25 c m	"	"	" "
At crown,	25 c m	"	"	" "
Length of head,	14.9 c m	"	"	" "
Breadth of head,	11.6	"	"	" "
Entire leg,	7¾ in.	"	"	4th "
Thigh,	3⅛ in.	"	"	" "
Heel to knee,	4⅝ in.	"	"	" "
Entire arm,	7¾ in.	"	"	" "
Humerus,	2½ in.	"	"	" "
Forearm to end of thumb,	5¼ in.	"	"	" "

In the above tables are given the initial measurements and by referring to the charts, which give the percentage of increase in each case when a measurement was taken, the absolute increase of any part in any interval can be computed. The figures at the sides are per cents. and those at the bottoms are months. The years are indicated by heavy lines, and the dotted vertical lines between indicate the periods within which certain motor co-ordina-

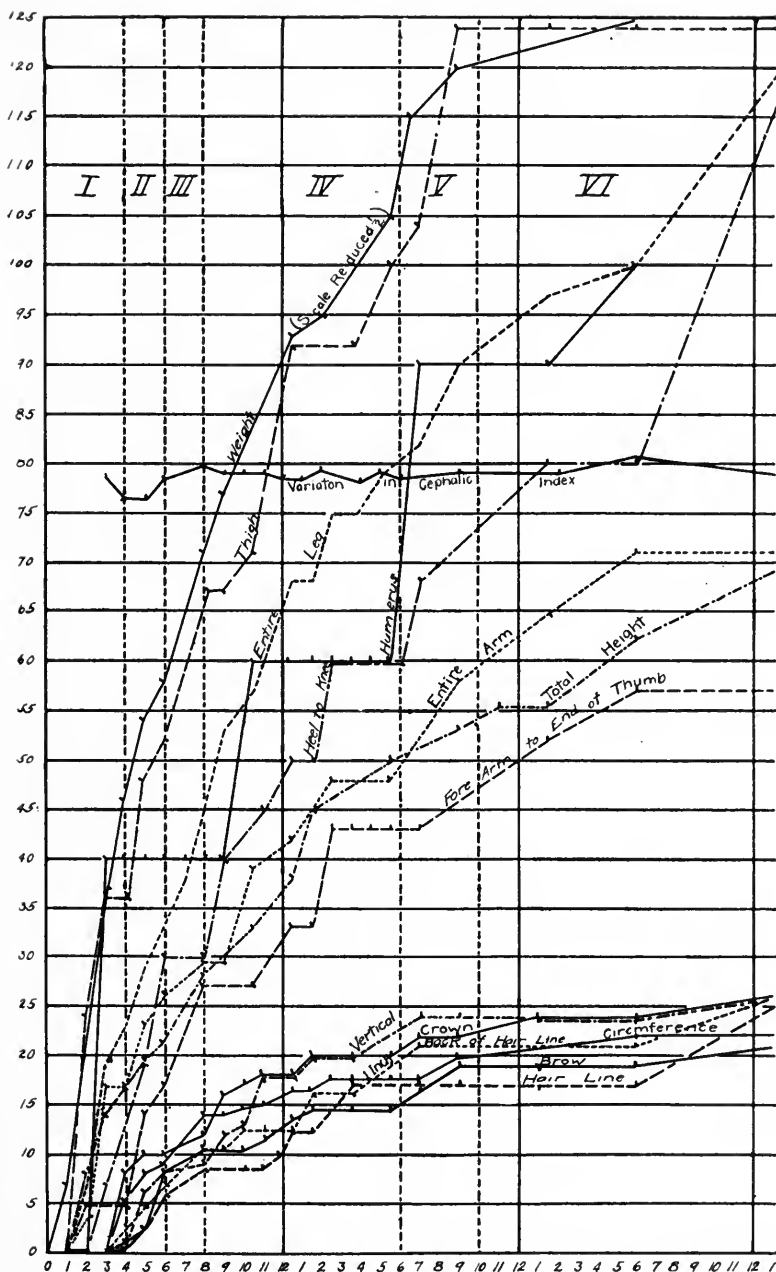
tions and striking mental characteristics developed. The points at which measurements were taken are indicated by marks on the curves wherever the changing direction of the curve does not itself show the points.

Chart I.



It will be noticed from these curves that it frequently occurs when one limb or section of a limb is increasing rela-

Chart II.



tively rapidly, that the other limbs or sections of the same limb are retarded, these in turn having their period of acceleration at another time. Whether there is any relation between these periods of acceleration and retardation and the development of the various motor and mental co-ordinations it is, of course, impossible to determine on the basis of so little data. In the case of the oldest boy, especially, there appears to have been more or less acceleration in the growth of certain parts; e. g., of the thigh during the period preceding the development of creeping and walking, while there seemed to be a retardation of the same parts during the development of this co-ordination.

It seems to me highly desirable that further observations of the type here presented be made through a considerable period. Even a few records of this sort, if carefully kept, will be of much more importance for the working out of various details of mental and physical development and their interrelations than are the measurements of large numbers of different individuals taken only once, of whom practically nothing is known except that each is approximately of a certain age.

# THE USE OF EXPERIMENT IN TEACHING EDUCATIONAL PSYCHOLOGY.

Report of the Meeting of New York State Teachers of Educational Psychology,  
held at Ithaca, April 8 and 9, 1910.

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*Teachers College, Columbia University.*

What does a teacher of educational psychology hope to gain by introducing experimentation into the work of the course? Is his main purpose to make the course more attractive, or to gather new experimental data of value to educational science, or to begin the training of young psychological investigators, or merely to familiarize the students with experimental methods and ideals? Does he expect by making use of experiments to teach the facts of his subject more rapidly or more surely than is otherwise possible? What educational returns compensate for the hours taken from the regular routine of instruction, the money expended for apparatus and supplies, the drain upon the instructor's time and energies which efficient management of experiments demands? By what criteria is the relative worth of particular experiments to be judged? To what standards must they conform?

These are some of the questions which challenged the thought of a group of New York State teachers of educational psychology on the occasion of a meeting held at Ithaca, April 8 and 9. Out of the spontaneous, informal discussion emerged certain conclusions, and these the present writer has undertaken to summarize in the hope that they may prove suggestive to a larger circle of teachers when they reflect upon the functions of experiment in the teaching of educational psychology.

Dr. Bell launched the subject by outlining the experimental work as now conducted at the Brooklyn Training School. Here one period a week, or twenty per-cent. of the time of the elementary course, is devoted to work in the laboratory. A variety of experiments is provided, ranging all the way from the mapping of the blind spot to tests of the rapidity of learning. Each student has in his special charge some one experiment and also serves as observer in several others. In his capacity as observer he is brought squarely face to face with the data of psychology; he is compelled to introspect, and to introspect systematically. Thus he not only gains power and skill in self-observation; he also carries from the laboratory into the class room a body of freshly gathered fact about his own mental life which adds concreteness as well as interest to the whole course.

This method of conducting the experimental work yields a value to the student as experimenter upon which Dr. Bell laid much stress. It develops tact and insight into human nature. In modifying his questions so as to elicit the fullest and most adequate introspective report from each of his many observers the student gains valuable practice in questioning, and in adapting his attitude to differing temperaments and types. These abilities have a direct application in the school room. Dr. Bell is convinced that these advantages are of sufficient importance to warrant the additional expenditure of time on the part of the instructor which this "laboratory method," as contrasted with the "method of the class experiment," involves.

As illustrative of certain very different uses to which experiment may be put, Professor Norsworthy described an experiment in memory which has proven its worth in her classes in Teachers' College. Her aim in using this experiment is partly to create in the students a respect for scientific data as contrasted with mere general opinion or with "my experience." As a preliminary to the experiment the class is led to consider the relation between rate of memor-



izing and retentiveness. Nearly everyone is positively certain that the slow learner retains long and well what he learns, while the quick memorizer soon forgets; and to this fallacy of "easy come, easy go" the large majority of the students insist upon committing themselves. The experiment consists in memorizing a German-English vocabulary. To this is devoted twenty minutes a day, five days a week for three weeks. At the close of each daily study period the student turns to a set of test sheets and writes the English equivalents for the words he has learned. One week after the completion of the practice series and again after one month has elapsed tests are given consisting of fifty words chosen at random from the portions of the vocabulary which all have learned. When the results are tabulated the class sees that those who learned the fewest words in the given time retained the smallest instead of the largest percentage of what they had learned. Their astonishment is wholesome and mentally invigorating. Henceforth they have a new respect for fact in the realm of psychology, and begin to cultivate a healthy skepticism regarding unsupported assertions and unverified aphorisms.

Miss Whitley described some of the experiments in perception, analysis, practice and fatigue which Professor Thorndike uses in connection with a large lecture course at Teachers' College. These are partly class experiments and partly experiments to be performed at home by each student individually. They have the immense advantage over mere demonstration experiments that they make each student an active participant.

Dr. Piez, describing some of the devices he has found useful in his teaching at Oswego, urged that the main purpose of experiment was illustrative and that it should serve as a point of departure for class discussion.

Professor Rejall, of Albany, suggested that owing to the high educational importance of the facts of individual differences, one of the main purposes of the experimental work should be to bring these differences clearly to view.

Several rather special purposes were also mentioned, but these it is not necessary here to elaborate, as they are only particular aspects of the larger aims already stated. The larger aims, it seems to me, reduce to four:

(1) The chief end of the use of experiment is *to teach* more efficiently *the facts* of educational psychology, by stimulating in each student a lively mental reaction, by compelling introspection, by making the experiences studied more vivid and concrete, thus adding interest and attractiveness to the whole course.

Other purposes of comparable importance are (2) to secure a wholesome *respect for facts* and a discontent with mere opinions or unsupported assertions regarding the mental life; (3) to develop, as all science teaching should strive to develop, a growing *familiarity with scientific methods and ideals*; and specifically (4) to give a certain elementary *training in the technique* of psychological experimentation. Of these four aims, only the one last mentioned can be ignored without danger of distinct loss to the student.

Any experiment, to realize these aims, (1) should employ the simplest possible technique and materials; (2) should be economical of time; (3) should be clearly relevant; (4) should, as Professor Seashore has recently pointed out afresh, be sufficiently intensive to make it vital; <sup>1</sup> and (5) should be unequivocal in result. Moreover, (6) care should be taken to guard against the introduction of experiments that make the student feel foolish or that tend to show the "superiority" of the instructor. And finally, (7) in order to insure a maximum of *educational* interest and value, it is desirable that experiments be selected as far as possible from the educational experience of the students and should have an obvious relationship to school situations and problems of teaching.

In applying these criteria to the selection of individual or class experiments many complex problems arise. The length

<sup>1</sup> "The Class Experiment," this JOURNAL, Vol. 1, No. 1, p. 26.

of the course, the amount of available room and equipment, the size and maturity of the class and the nature of their previous scientific training, psychological and otherwise—these and many other factors will modify the relative emphasis upon the various aims. For example, if the course in educational psychology is closely allied with courses in methods, it may be desirable, as Miss Long of the Rochester Training School suggested, to connect the experimental work with the work in observation.

Only a beginning was made at compiling a suitable suggestive list of experiments. This will be one of the important topics for subsequent meetings to consider. Meanwhile it is highly desirable that teachers of educational psychology should be searching for experiments that most closely fit the needs of the elementary educational psychology course. It was the sentiment of the meeting that about ten per cent. of the total time of the course could profitably be devoted to experimental work.

At the beginning of the Friday evening session Professor Whipple led a discussion on the teaching of the nervous system, the topics to be emphasized and the time to be apportioned to each. For the most part, a surprising unanimity of opinion prevailed, except upon the general question of the value of the study of the nervous system. Professor Titchener stoutly argued that since the physiologist knows so little about neural processes within the brain, the less the psychologist has to say about the nervous system at present the better.

Miss Clarke of Kansas University, at present a student at Cornell, read a paper on the introspective analysis of the thought processes and reported the results of an experimental study of certain characteristic attitudes, of surprise, doubt, interest, assent and the like. Using Woodworth's device of proportions for bringing feelings of relationship into clear consciousness, she has obtained results contradictory to those

he has reported, finding in the analysis of several hundred attitudes not more than two possible cases of "imageless thought."

Professor Titchener gave a general account of the researches now in progress under his direction, and opened all the rooms of the capacious and marvellously equipped laboratory for inspection. An enjoyable social hour in the seminar rooms brought the evening session to a close.

In order to continue these meetings of educational psychologists no formal organization was deemed necessary; but the arrangements for a meeting next year were left in charge of a committee consisting of Professor Whipple, chairman; Dr. Chase of Buffalo, Professor Forbes of Rochester and the writer. It is not certain whether the meeting will be held at Rochester at the time of the Christmas meeting of the State Teachers' Association, or at Easter time. The topics suggested for discussion, in addition to those already mentioned, include the order of presentation of topics in the educational psychology course.

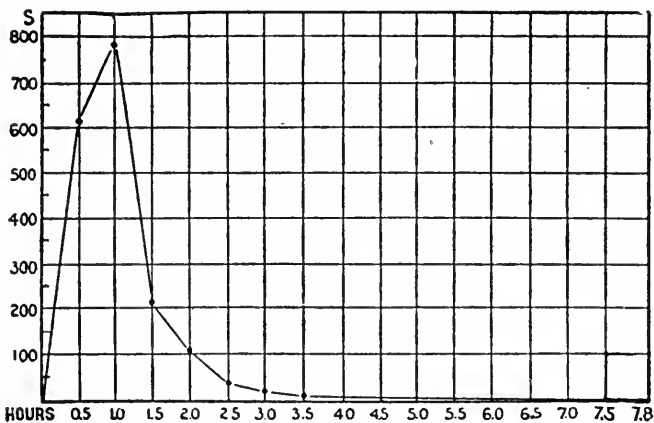
## COMMUNICATIONS AND DISCUSSIONS.

### THE MID-DAY NAP.

One year while I was at Yale, I approached the physical director, Dr. Seaver, on a balmy April day and asked him to prescribe a tonic. He looked me in the eye, and the following conversation ensued:

"What is the first thing you do after dinner?" "I go to work—study." "Are you a gentleman?" "I am trying to be." "Are you a Christian?" "I am trying to be." "A Christian gentleman, and take no rest after dinner!"

I took that rest tonic as prescribed, have continued to take it, and have had no need of any other. It has assumed the form of a fifteen-minute mid-day nap, my principal meal coming at noon. Realizing the great benefit in this, I have been interested in casting about for a psychological justification of it.



This I find chiefly in the curve of sleep. The curve of sleep, as measured by the relative strength of stimulus required for awakening a sleeper at different stages of the sleep, is shown in the accompanying figure (Kohlschütter). The numbers at the bottom indicate hours

of the sleep; the height of the curve shows the height, in centimeters, from which a ball must be dropped upon a metal plate in order to awaken the sleeping person. The curve shows that the normal sleeper falls immediately into a profound sleep which reaches the maximum at the end of the first hour, then becomes lighter very rapidly during the second hour, and remains light for the rest of the night. Quantitatively, the sleeper gets more needed rest out of the first one-fourth of the night than out of the remaining three-fourths.

This relative form of the sleep curve has been verified for various conditions. The feature which concerns us is that the greatest benefit from normal sleep, night or day, comes from the very first part of it. From this we may derive a principle of mental economy: *Cut short the long light sleep of the late morning hours and substitute a short sleep at some favorable time during the work day.* Fifteen minutes of sleep after the heaviest work and the main meal of the day will count more for efficiency than five times fifteen minutes of sleep in the morning. The curve of day sleep has the same form as the curve of night sleep; but is usually very much smaller. From ten to twenty minutes would cover the period of deepest sleep in the day rest of a normal brain worker.

But several conditions enter. Many persons cannot fall into sound sleep in such a short time during the day. The ability to go to sleep is, however, largely a matter of habit which most persons may readily acquire by reasonable persistence and favorable conditions. The nap must be so taken that it shall not interfere with the night's rest; the most favorable duration of the nap varies with different individuals, but it should not be long under any circumstance. It must be so taken that it shall not result in stupor at awakening; the best precaution is to take the nap in a cushioned easy-chair, with the body slightly reclining. This position will prevent the rush of blood to the brain. The advantage of sleep is that it gives the most adequate relaxation of body and mind. The advantage of an after-dinner cigar is that it furnishes relaxation and repose; but the feeling of restfulness after a quiet smoke is due in part to the artificial stimulation while the restfulness felt after a nap is the natural feeling of restoration.

Brain workers seldom die of brain disease. They, ordinarily, die of stomach trouble or related organic disorders, and in most cases this

is due to the fact that there is no cessation in the brain work during the day and the stomach suffers in competition with the brain for vital energy. The nap serves two purposes after dinner in that it rests the brain and gives the stomach a chance.

In the coming fight for health and natural living, the demand for economic periods of effective relaxation will be a feature. And for effective relaxation, when circumstances permit it, I know of no more efficient form than the mid-day nap.

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University of Iowa.

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The department of psychology of the University of Minnesota has organized a free clinic for the study of mental development. Dr. H. H. Woodrow, who has immediate charge of the work, is conducting a course in mental retardation. Dr. Woodrow will have the assistance of Dr. J. P. Sedgwick, of the College of Medicine, who will superintend the physical examination of the children, and of Mr. W. M. Duke, a specialist in the correction of stuttering and stammering, who will take charge of the training for the correction of speech defects. A special investigation of speech disturbances will be made.

## ABSTRACTS AND REVIEWS.

OLIVE M. JONES, ELEANOR G. LEARY, and AGNES E. QUISH. *Teaching Children to Study*. New York: The Macmillan Company, 1909. Pp. vi., 189.

If the reader expects to find within the covers of this book the usual cut-and-dried prescriptions on "how to teach children to study" he will be sadly—or happily—disappointed. For "teaching children how to study" is simply one of the inevitable consequences of the application of a group system of teaching whose technique is here explained. The nature of the book is thus really more adequately described by its sub-title: "The Group System Applied."

The group system, so the author tells us, has been slowly evolved from a number of other methods of conducting recitations which have been weighed in the educational balance and found wanting. It is a compromise plan, securing the advantages of the other systems while avoiding their defects.

The forerunner of the modern city school was the district school. Its chief merit was the opportunity which it afforded for giving individual training. As the school population increased, however, it became necessary to establish the graded school, so that children of approximately like attainments might be grouped together. But the uniformity of attainment which it assumed was largely illusory. Children of the same age vary from the exasperatingly dull to the phenomenally bright. And since it is the interests of the majority—the average child—that must be conserved in mass education, it was inevitable that injustice was done to the exceptional child, whether the very bright or dull. With this subordination of the individual, teaching began to lose the direct and vitalizing touch which it had in the district school; and verbal memorizing replaced comprehension. To counteract these evils our training schools organized a highly elaborate technique in teaching-method and lesson-planning. Teachers were thoroughly drilled in constructing plans, embodying subject-matter and method, by following which the child's mind could be effectively prepared to assimilate the new matter and be led to make the comparisons, abstractions, generalizations and applications demanded by the adequate mastery of a lesson. This emphasis upon the instruction



aspect of the teaching process, praiseworthy as it is, resulted in a neglect of the drilling and testing aspects, and proved to be especially subversive of the habit of independent and self-reliant study on the part of the pupil. He learned to depend upon the teacher to make everything clear, and was not trained to exert his own efforts.

Recognizing these defects of grade teaching, educational experimenters have evolved various substitutes or variants of the grade plan. The study periods have been relatively lengthened and the pupils given opportunities to work under the teacher's direction (Pueblo plan); or the rate of progress has been made variable, so as to afford stopping places for the slow and allow the bright pupils to forge ahead (Cambridge plan); or pupil teachers have been appointed to assist the weak; or the program has been divided into alternate class and study periods (German Blocking System); or it has been so constructed as to allow regular periods of individual instruction from the teacher to alternate with class recitations (Batavia plan); or the children of one room have been divided into four or five rigid groups, maintained for fixed periods, with promotion from group to group (Elizabeth); or the division of the grade into sections for slow and bright pupils, or for slow, bright and over-age pupils, progressing at different rates, with promotions at the end of the term (New York City); or the establishment of special classes for three kinds of pupils, immigrants, over-age pupils, and pupils entitled to leave school for work by virtue of their age, but lacking in the scholastic requirements. (New York). The latter plan was a sort of reversion to the type of the district school (with a number of grades in a room), but it brought together pupils who could not be taught as a unit, and consequently led to the experiments in New York City with the group plan in the regular classes, of which this manual is a valuable exposition.

The author distinguishes three types of grouping. In the oldest, the *constant group plan*, the pupils remain for fixed periods in the *fast*, or *normal*, or *slow* group in which they have been placed. The grouping is maintained throughout the course. It aims especially to advance the bright pupil. The *grade-group plan* is feasible in large classes. All the pupils in a grade constitute one class grouped into slow, normal and fast groups. The groups are constant in a grade as a whole, but the shifting plan obtains within the class in at least English and arithmetic.

In the *shifting group plan*, which is the ideal one for graded schools, the pupils are grouped into three variable or shifting divisions. The grouping is determined by testing the class on a lesson which has been presented to the class as a whole. This gives two groups: those who fully comprehend the new points presented and who accordingly only need further drill (A), and those whose mastery is defective and need further instruction. These are then instructed again during the following period, and likewise tested. On the basis of the mastery displayed they are subdivided into two sections, B and C. B now receives the same drill (seat-work) that A received in the previous period. In the first half of the third period A is quizzed by the teacher on the previous day's work, C listening meanwhile or doing seat-work; and in the second half the pupils in C get individual attention. Finally the class is tested as a whole, to determine whether to proceed to a new step. When the new matter is presented it is presented to the class as a whole. After tests as before described they are grouped anew into three divisions. Thus the grouping constantly shifts, as dependent upon the degree of mastery of the new step which the pupils show. The greatest variation in the grouping will be in arithmetic and grammar, but it will tend to grow progressively more and more constant, especially in reading.

The advantages of the shifting plan are: It allows alternation of study and instruction periods, individual instruction as well as whole-class recitations; it enables the teacher to detect the specially weak pupil and does full justice to both the weak and the strong; it requires grouping only in some branches and these are in the essentials; it restores the drill to its rightful place in the teaching process; the drills are made dynamic by requiring the child to apply in his seat-work the knowledge acquired to new instances and in new forms; the drill thus gets a new interpretation in terms of self-reliant study. The two most pronounced merits of the plan perhaps are that it inculcates habits of independent study and brings the laggard up to grade.

Separate chapters are devoted to a discussion of the limitations and difficulties of the plan (logically this chapter should have come after an explanation of the plan), the questions pertaining to the program, the instruction and study periods. To assist the novitiate in the management of the study period, more than half of the book is devoted to describing plans for seat work in reading, arithmetic, composition, geography, etc. This material is, for the most part, very judiciously

selected, but it supplies but a small nucleus of the material which every teacher using the plan must have at her ready disposal.

To the extent that the shifting group plan fulfills its avowed mission it supplies an educational instrument of the greatest value. The problem which it attacks constitutes one of the most vital questions before the educational expert of the day: the adaptation of educative forces to the needs of the special pupil; getting hold of the individual child. Whether the shifting group plan of recitation is able to wrestle adequately with the problem is another question. The scheme, until it has been rendered automatic in its operations, must be very cumbersome, time consuming and confusing to the teacher. It is doubtful whether, with it, a scientific program can be constructed, one having regard for the course of diurnal fatigue. Nor would it seem possible to get around in one period to all the pupils sufficiently well to determine their grouping. But the possibility of constant regrouping will minimize this objection. In the reviewer's opinion, the individual pupil will not get the training to which his birthright entitles him until, by law, every child that enters the portals of the school is subjected to a physical and psychological examination, and placed in a special room with his similars, according to the results of these examinations. True educational economy will some day demand that the average grade pupils be grouped by themselves; that the very bright be segregated in another room, and the dull in still another; and that specially qualified teachers will concentrate all their energies upon the training of only one of these groups. This is probably Utopian, so far as the immediate future is concerned and so far as concerns the average grade school.

Miss Jones' discussion may be commended as a clear and straightforward exposition of the group system, and it is to be hoped that the plan will be given the thorough experimental testing in our elementary schools which it merits. It offers an excellent starting point for mass tests in experimental pedagogy.

J. E. WALLACE WALLIN.

Cleveland Normal Training School.

W. WUNDT. *Ueber reine und angewandte Psychologie*. Psychologische Studien, 5: 1 u. 2. Heft, June, 1909. Pp. 1-47.

"Es ist nicht genug zu wissen, man muss auch anwenden." Taking as a text these words of Goethe's "Wanderjahren," the author discusses some of the dangers into which present-day psychology, in its effort to put its results to practical uses, seems to him to be falling. The first section of the article is devoted to an appreciation of the pressing need for the application of psychological knowledge in many widely different branches of investigation, especially in the practical fields of jurisprudence, psychiatry and education. To this end Kraepelin has done extremely valuable service in devising simple tests which give definite answers to certain simple questions and which demand for their use no complicated apparatus and no prohibitive amount of time. In the same category as the Kraepelin tests belong the observations reported by Stern in his "Psychologie der Aussage." It is important, however, to remember, and Kraepelin is careful to emphasize the fact, that neither the Kraepelin tests nor the observations of Stern pretend to give a complete psychological analysis of the processes involved. And for practical purposes this is often not necessary. The judge, for example, wants to know primarily only the probable objective validity of the report of an eye-witness. For the educator, on the other hand, it is of the greatest interest to know whether the inaccuracy of the report is due to faulty perception or memory, to deficiencies of attention, to lack of interest or of practice in observation, or what not. In general, therefore, pedagogy, more than any other branch of applied psychology, presupposes a close dependence on pure psychology.

The influence of practical interests may be seen, further, in the so-called "memory experiments" to which so large a part of the experimental psychological investigations of the day are devoted. Among these one may distinguish two different classes. Experiments of the first class, to which belong all those on the "economy and technique of memorizing," are concerned primarily with obtaining results which have a direct practical bearing. Investigations of the second class, on the other hand, have, besides the practical, also a theoretical interest, in that they lead finally to problems of pure psychological analysis. It is evident that results of this second kind of experiments have a much greater general value and a much wider field of applicability than results of the experiments of the first sort. In fact, "every experienced

educator will admit that in coping with the general problems of training and teaching, a well-rounded psychological education is incomparably more fruitful than the collection of a mass of isolated technical observations."

Pedagogical problems may be divided into three classes, the practical-technical, the practical-theoretical and the purely theoretical. To the first belong investigations of pedagogical methods, of practice, fatigue, etc. Among the problems of the second class we have the determination of differences due to natural talent, to age and to sex, as well as the study of the best means for arousing and holding interest. Finally a field closely related to the practical ones but in itself purely theoretical is found in the study of the several directions and phases of the child's development. The close connection of investigations of these three kinds with each other and with pure theoretical psychology is evident. Especially problems of the third type presuppose for their solution detailed and exact psychological knowledge. And it therefore seems incumbent on theoretical psychology to furnish such knowledge. Just here, however, the demand for practical application seems in part to defeat its own end. For psychology sets for herself the example of the natural sciences, especially physics and chemistry, with their wide applications in the industrial world today, and forgets thereby that both physics and chemistry had a long history of purely theoretical development before they were ripe for industrial application. So it comes about that the attempt of psychology to meet the practical demands of the day brings with it not only certain undeniable advantages, but just as undeniable disadvantages, both for pure psychology and for pedagogy herself. For, in her effort to obtain practically useful results, psychology narrows her field not only to the exclusion of other more fundamental investigations, but also to the detriment of the wider interpretation of the results which she does obtain. And pedagogy is thereby betrayed into the use of experimental results whose true significance and whose limitations she does not understand. Moreover, because of the undue value placed on experiments which allow of immediate practical application, there is too much emphasis laid on external technical questions of instruction. "The teacher who sees himself surrounded on all sides by memory experiments will recur too easily to the old, and as we hoped, happily uprooted superstition that the technique of memorizing is one of the main aims of teaching, and that through industrious memorizing

all the goals of education are at length attainable." However true it may be that one should not only know but also apply, "it is none the less hazardous to try to apply knowledge that is too limited or rests on too uncertain foundations."

The purpose of the present paper is, however, not to discuss the question from the pedagogical standpoint, but to indicate the harmful effects which the too exclusive emphasis on practical (especially pedagogical) application has had on psychology itself. These are:

*First*, a tendency to premature generalization of results obtained under restricted conditions.

*Second*, a tendency to deal with general conceptions which, formed in the first place on the basis of very limited experience, are later used as the explanation of other facts which are subsumed under them. This is nothing more nor less than a return to the old faculty-psychology.

*Third*, as a result of this premature generalization and formation of schematic concepts, an inadequate and contradictory interpretation of phenomena, which expresses itself now as a failure to take account of actually observed facts, and again as reading into the facts elements that the most careful observation fails to detect, and that owe their supposed existence only to logical reflection.

Practically all the rest of Professor Wundt's article (nearly thirty pages) is occupied with illustrating the above points by a detailed criticism of Ernst Meumann's "Intelligenz und Wille." The criticism is prefaced by an appreciation of Professor Meumann's justly high standing as a psychologist and educator, and by a tribute to the clearness and keenness of observation shown in this work. For this very reason Wundt has chosen this book to illustrate what he means by the harmful influence of practical pedagogy on theoretical psychology. The main points of the criticism are: (1) Meumann's conclusion, "wie können durch Übung alles erreichen" (p. 42) rests on two illicit generalizations of limited observation: first, the concept of mental work is applied alike to everything from the simplest form of memorizing to the most complicated achievement; and second, conclusions reached for the lowest member of this very broad class are applied without reserve to all its members. Moreover, Wundt sees reason from his own and others' observations to deny the existence of unlimited improvement through practice even in the case of the immediate retention of a series, Meumann's own example.

(2) In his description of the several intellectual capacities (*Fähigkeiten*) and their relation to each other, and especially in his too sharp separation of memory (*Gedächtnis*) and imagination (*Phantasie*), and in his discussion of their influence on each other and on intelligence, Meumann seems to be reviving the old faculty-psychology in an only slightly modernized form. Here again (according to Wundt) Meumann is trying to operate with general concepts instead of with observed and carefully analyzed facts.

(3) Meumann's discussion of the will is criticized on the ground: first, that its extreme intellectualism is not sufficiently established; second, that it fails to take into account any affective experiences but pleasantness and unpleasantness (this, of course, from the point of view of the well-known Wundtian theory of the emotions); and third that it is in several points self-contradictory. These contradictions (again according to Wundt) have their origin in a premature generalization both of concepts and of experimental results, and in a consequent attempt to apply conclusions gained in one field to facts of a widely different nature.

This brings the author back to his main point, namely, that "the premature attempt at practical application leads to the formation of conceptions in which the standpoint of the faculty-psychology repeats itself. The mechanical use of the conception of faculties then allows the foremost task of psychology, the description and the experimental analysis of mental processes, to be pushed into the background. And finally, in and through this effort for practical value, the one-sided emphasis on the psychology of memory and the technique of methods of learning, though it here and there gives useful hints to practical pedagogy, reminds one to a suspicious degree of the formal memory-drill of the older Pedagogues, which we had thought was happily outgrown, and the complete discarding of which ought to be one of the most important duties of psychology in its application to pedagogy. Where modern psychology, through its too eager effort to serve practical ends, results in an out-of-date mnemo-technique in learning and teaching, in the formation of mind and character, then surely these practical consequences can be looked on as a certain indication that theory itself has somehow gone astray."

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J. DEWEY. *The Moral Significance of the Common-School Studies.*  
Proceedings of the Northern Illinois Teachers' Association, 1909.  
21-27.

This paper comprises a discussion of the principles which underlie the effective functioning of educative materials in moral culture. Subject-matter of instruction represents the "results of past human social struggles and achievements." Mind, on the other hand, is a manifestation of primary impulses in their efforts to master the environment. Because of the fact that art and science are something more than mere intellectual products—because of the fact that they "have been worked out in the long-continued, arduous struggle of man to come into sound and effective connection with nature and with fellow-man"—they are full of moral meaning. It follows that when studies are treated purely from the intellectual standpoint they fail of moral influence.

The author criticises the teaching of art because of the neglect of this principle. "Given genuine art . . . the chief condition of its moral influence is that it be unconsciously absorbed, not consciously driven in, raked over, and pulled up." Dewey's warning here is not new to teachers. Indeed, this important truth has been "discovered" by almost everyone who has spoken or written upon the educational aspects of literature within the past decade. The principle is clear enough, but it suggests only a negative "cue" to conduct. What the teaching of literature stands in direst need of is a set of principles which will suggest what one may do rather than what one must not do.

The advice concerning the teaching of history from the moral point of view is much more positive and explicit. The secret here, of course, is to teach history from the social standpoint. "History affords the materials for apprehending the typical *problems* [of human experience], the chief *obstructions* to development, the chief *methods* of progress." The moral value of history is measured by the extent to which it may be applied to the understanding of present events. The "biographical" method in history is criticised on the ground that it commonly encourages an abstraction of the individual hero from his environment. It is only when the leader is seen "as one individual among many, summing up by guidance their powers, and meeting needs which help in the peculiar social situation in which he lives and works" that biographical stories fulfill their real function in moral training.



Geography quite naturally fulfills a moral function when emphasis is laid upon its social phases. "The ultimate significance of lake, river, mountain, and plain is not physical but social,—the part played in modifying and directing human relationships." It is through the information which geography imparts that its true ethical value is realized, for "morality severed from an understanding of the conditions in which action takes effect is sentimental or else routine."

The treatment of arithmetic emphasizes the necessity for some effective form of motivation. "Let the child get a consciousness of what is the use of number, of what it really is for, and half the battle is won." But "this consciousness of the use of reason implies some end which is explicitly social." Just what place is to be accorded to the instinctive liking of the child for formal and mechanical repetition is not clear. It may be that this "need" ought not to be gratified, notwithstanding the fact that its temperate employment greatly lessens the difficulties of teaching primary arithmetic. Training in neatness, accuracy, etc., is a moral value only when the child can extend these virtues beyond the sphere in which they have been attained, and this is possible "only when mathematical relations are seen in their connection with the realities."

The latter part of the discussion follows, in the main, the author's treatment of the same topic in his *Moral Principles in Education*. Especially consoling in the light of the recent heredity investigations is Dewey's concluding sentence: "If such moral training seems slow and roundabout, we may yet encourage ourselves with the reflection that virtue is not a miracle but a conquest, and character not an accident but the efficacious growth of moral powers."

W. C. B.

ELIZA R. BAILEY and JOHN M. MANLEY, Ph.D. *The Teaching of Spelling*. Pp. 16. *The Bailey-Manley Spelling Book*. Boston: The Houghton-Mifflin Company, 1908. Pp. vi., 154. \$0.25.

The spelling book, which is also published in two parts (Grades II-IV and Grades V-VIII), contains a brief explanatory preface, and is accompanied by the short teacher's manual listed first above. In arranging the speller, the compilers sought, they say, both to avoid the mistake of the old method of bringing together in a list words spelled and pronounced alike and of the newer method of introducing each new

word as if it and its derivatives stood alone. The spelling exercises are classified by the year in which they are to be taken up, and are accompanied by short selections of a literary character for the purpose of interesting the child in the study of spelling and of quickening a love for good prose and verse.

The following are the chief principles upon which the authors have based their system: (1) A successful system of spelling must take into account all forms of ideational or memory-type, and not seek to impress words by any single form of memory. (2) Spelling to be perfect must be automatic. (3) The child should not be compelled to learn rare and unusual words, but only those that are needed in the ordinary affairs of life. (4) Teachers must be careful to ensure correct spelling under all circumstances, whether in conjunction with the spelling exercises or in conjunction with other school work. (5) The teacher must devote time in connection with the assignment to aiding the pupil to studying the lesson. (6) "Perfect spelling should be established as the aim of every child." (7) Great care must be taken with pronunciation, especially of new words, both by teacher and pupils. (8) Special devices should be used to enable the pupil to concentrate his attention upon the most probable sources of error. (9) The old-fashioned spelling-match should be used to afford oral drill and to lend interest, variety, and inducement to study. (10) All new words, at least in the first two years, should be pronounced before they are spelled, and spelled orally before they are written. (11) New words are to be introduced by old words having the same elements. (12) To secure successful results, much time must be spent on the first lessons, and each lesson must be mastered, regardless of the time it takes, before the next is attempted. (13) The child should be trained, in so far as possible, to think of the sounds of the letters as he writes.

These principles will appeal to the teacher as being based upon sound psychology and confirmed by practical test.

G. M. W.

## NOTES AND NEWS.

Our English friends are evidently concerned about the disciplinary value of the classics. In a contribution of several columns to the *Oxford Magazine*, Professor G. G. Ramsey, who has taught Latin prose for more than forty years to large classes by all the methods that pedagogic ingenuity has devised, extols the disciplinary virtues of this subject. "I have found it," he says, "incomparably my most effective intellectual implement . . . . A student's progress in Latin prose affords the surest index of his mental development as a whole." To which the *Educational Times* (London) rejoins: "Yes, to the Latin professor, but not necessarily to anybody else." So, too, thinks the *Times*, the assertion of the Viennese Professor of Chemistry, who declared: "Give me a boy's Latin grammar and I will answer for his chemistry," is a long jump from the premises. "Latin prose, with all its excellencies, can hardly claim to be so unfailing a specific for breadth of view or for logical conduct of an argument."

The March issue of the *Pedagogical Seminary* is of special importance to those who are interested in school hygiene. Papers in this field read at the twentieth anniversary of Clark University by Drs. Leo Burgerstein, T. A. Storey, G. M. Whipple, H. H. Goddard and W. S. Small, and a paper on medical inspection by G. E. Emery occupy the major portion of the number. Summaries of these articles will appear later in these pages.

Experimental psychologists from Harvard, Princeton, Pennsylvania, Cornell, Bryn Mawr, Clark, Columbia, Smith, Mt. Holyoke and other institutions met at Johns Hopkins University, April 19, 20 and 21. The papers and demonstrations were of varied character and of exceptional interest and the attendance was large. Professor Thorndike explained the methods that were being used in working over the extensive data secured in the tests of Columbia freshmen, and the methods by which he proposes to secure standards for the scoring of handwriting and of English prose. Professor Münsterberg made

a plea for the independent development of applied psychology, with special reference to the applications of psychology to commercial and industrial problems. The other contributions were, for the most part, of a technical character. A feature of the program was the exhibition by Dr. Franz of a monkey whose occipital lobes had been destroyed by section and cauterization, but which seemed to exhibit a normal capacity for visual discrimination.

Among the papers presented at the meeting of the New York branch of the American Psychological Association on April 25 the following were of interest to educational psychologists: "Correlation of Mental Abilities," B. R. Simpson, The Brooklyn Training School for Teachers; "Development of the Sense of Form in Feeble-minded Children," Dr. Henry H. Goddard, The New Jersey Training School for Feeble-minded Boys and Girls; "Indications of Incipient Fatigue," Professor Will S. Monroe, New Jersey State Normal School.

The Minnesota Psychological Conference, which met at the University of Minnesota, April 1, 1910, devoted the whole of the morning session to a Symposium on Retardation. Supt. F. E. Lurton spoke on "Retarded Children in Minnesota Schools," Dr. H. H. Woodrow discussed the "Literature of Retardation," Dr. E. A. Meyerding showed the relation between "Retardation and Physical Defects," and Dr. A. C. Rogers treated "Backward and Feeble-minded Children from the Institution Standpoint." At the afternoon session Supervisor J. H. Harris presented a paper on "An Inquiry Into Children's Interests in Written Composition," and Mr. A. S. Edwards read one on "Suggestibility in School Children."

The Brown University Teachers' Association held its eighth annual meeting on April 22 and 23, 1910. The College Freshman was the general subject at the first session, and at the second "Teaching How to Study" was discussed. At the latter meeting the following papers were presented: "How to Secure from the Pupil Initiative and Independent Effort," by John S. French, Principal Morris Heights School, Providence; "The Study Habit and How to Cultivate It," by Stuart H. Rowe, Brooklyn Training School for Teachers; "How to Study, and Teaching How to Study," by Frank W. McMurry, Teachers College, Columbia University.

The University of Vermont has issued an attractive circular announcing an elaborate course of extension lectures by the members of the faculty. These lectures will be available next year for schools, societies and other organizations throughout the state.

Francis Galton, F. R. S., has made a further donation of £500 for the maintenance of the Francis Galton laboratory for the study of National Eugenics during the year 1911-12.

Professor Lloyd Morgan, for twenty-two years Principal of University College, Bristol, Eng., and now Professor of Psychology and Ethics in the University of Bristol, has been presented with a quantity of plate and books in recognition of his services to higher education.

Andrew Carnegie has given \$3,000,000 to establish a fund for the benefit of teachers engaged in the ten principal cities of the United States. One object is to enable selected teachers to study educational methods in other countries.

Mr. B. R. Simpson, of the department of psychology and education, Brooklyn Training School for Teachers, will engage in summer school work in the University of Georgia this summer. Mr. Simpson will offer two courses, one in "Educational Psychology" and one in "Principles of Education."

Dr. Charles Hughes Johnston, assistant professor of education in the University of Michigan, has been appointed Director of the School of Education in the University of Kansas. Dr. Johnston will be succeeded at the University of Michigan by Dr. F. S. Breed, who has been conducting investigations in comparative psychology at Harvard University.

Mr. L. W. Cole, formerly professor of psychology in the University of Oklahoma, more recently instructor in psychology in Wellesley College, has been appointed professor of psychology in the University of Colorado.

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# TRAINING THE VOICE BY THE AID OF THE EYE IN SINGING.

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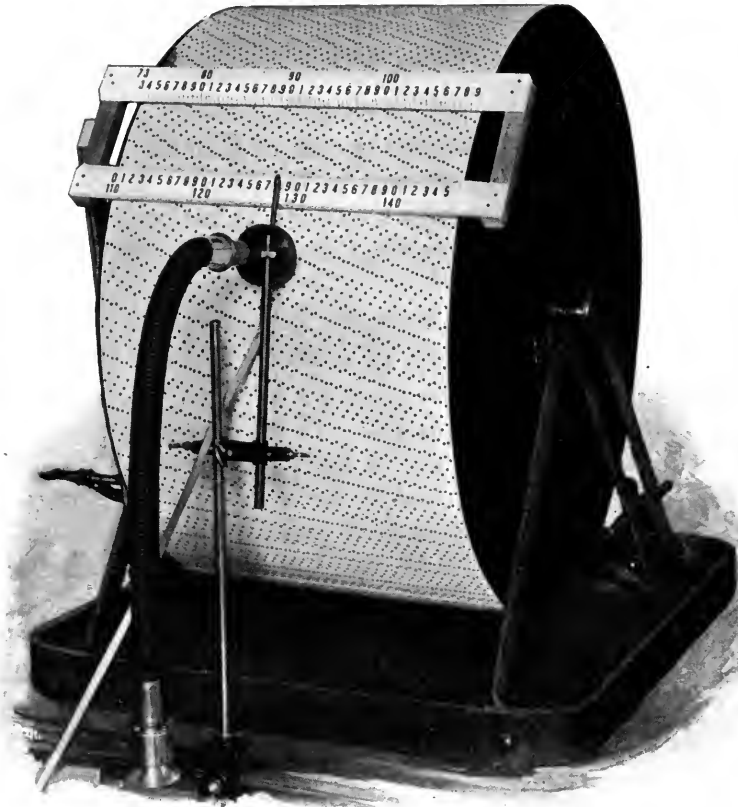
Can we facilitate development of control in the pitch of the voice by using an aid to the ear in training? And, may the ordinary limits of accuracy be exceeded by training with such an aid? The following experiments answer these questions quantitatively.

The limit of accuracy in singing is ordinarily set by the physiological limit of the ear, as measured by the least sensible difference in pitch. This limit varies in different individuals, but in a given individual it remains approximately constant in health, regardless of training. It is not probable that this limit is ever reached by ordinary methods of training, but if we have some means of doing for the ear what the microscope does for the eye, the time of approaching this limit by training may be shortened and the effectiveness of the ear may be increased. In other words, the singer may develop accuracy in pitch more rapidly and may reach a higher degree of refinement in his control of the pitch of the voice than could have been reached without the use of some such aid.

We used the voice tonoscope of the design shown in the accompanying figure.<sup>1</sup> The instrument works on the principle of the stroboscope, more familiarly known as the principle of moving pictures. It converts the sound vibrations

<sup>1</sup> For a full description of the instrument here used, see SEASHORE "*The Voice Tonoscope*," University of Iowa Studies in Psychology, 1902, III., 18-28. Since then the instrument has been rebuilt with many improvements. A description of the new model will appear in the same Studies, Volume VI.

into visual configurations which point out on a large, clear scale the actual vibration frequency of any tone that is sung before it. The reading is direct in terms of a vibration or a fraction of a vibration, and is accurate beyond the degree here



THE TONOSCOPE.

required. The singer sings before the speaking tube, which is connected with a sensitive flame capsule in such a way that every vibration of the column of air in the tube causes a vibration in the flame, and this vibrating flame selects from the series of dots those which correspond to the vibration



frequency of the tone. The operation of the instrument is such that the singer may, without restraint, sing within his own range.

The tests may be divided into (A) accuracy in striking a required pitch, and (B) the least producible change in pitch (minimal change). The former may be subdivided into (a) sounding a standard tone heard, and (b) striking an interval from that standard. The three intervals used were (1) the major third, (2) the fifth, and (3) the octave. The standard or fundamental tone was 100 vd.; the intervals were, therefore, 125 vd., 150 vd., and 200 vd., respectively. The least producible change was determined for each of these four tones (1) in the least producible sharp and (2) in the least producible flat from the note as actually struck.

The observer was given a preliminary practice both with and without the instrument. This was quite extensive, the object being to make sure that he was thoroughly familiar with the method and conditions of the experiment, so that the adaptation should not enter as a disturbing element in the first series. We worked with six observers, none of them professional singers, but such as could be considered good material for amateur singing.

The standard tone, heard in the telephone from a 100 vd. tuning fork, was a good, clear tone of agreeable intensity, and was sounded during one second for each trial. The singer was encouraged to sing the response about one second after hearing the standard, to sustain the tone about one second, and to make the interval between two tones sung in the minimal change series about one second.

Each period of practice consisted of one hundred and sixty trials, which took about forty-five minutes. The tests continued twelve days, approximately successive, and were divided as follows: The first five days the singer had no aid but depended entirely on the ear as in ordinary singing ("without aid"); then followed five days of singing with aid, that is, the record was read from the tonoscope in each trial, giving the observer an opportunity to correct himself

in the next trial ("with aid"); then the record of the eleventh day was taken without aid again, and the record of the twelfth day was taken with the aid. Thus, we obtained during the first five days a measure of the ability without the aid; the second five days, the ability with the aid, the measurements of the eleventh and twelfth days will show whether or not training gained by means of the aid is transferred to singing without the aid.

The results of these experiments on six men are shown in the following tables and curves. The numerals at the head designate the successive days of practice, and the initials at the left represent the observers. Each number in the body of the table represents the average error in pitch of twenty trials for the designated observer, day and case, in terms of vibrations. For the best singer the records were read in tenths of a vibration; but for the others only in whole vibrations, as the steadiness of the voice did not warrant any finer reading. In Tables V. to VIII., the column headed "%C" shows in what per cent. of cases the observer actually succeeded in making the sharp or flat. This is introduced merely to show the relative risk that the observer took of not making any change at all. These tables are made up from the mean of the sharp record and the flat record. The average record for the six observers is expressed in the curves. The numbers of the curves correspond to the numbers of the tables. All heavy horizontal lines represent the averages of the daily averages which are shown in the light curves. The appendages at the right show the averages for the eleventh and twelfth days, respectively. The zero point is below in every curve, hence a low point in the curve denotes relative superiority and a high point relative inferiority in the record.



TABLE I. SINGING THE FUNDAMENTAL.

	Unaided.						Aided.					Un-aided. Aided.		
	1	2	3	4	5	Ave.	6	7	8	9	10	Ave.	11	12
G. M....	.8	1.0	.4	.8	3.3	1.4	.5	.6	.7	.4	.9	.6	...	...
P. N....	3.4	.5	.7	1.1	1.3	1.3	1.0	.4	.6	.7	1.1	.6	.9	.7
D. S....	.7	1.4	1.1	.6	1.2	1.0	.5	.2	.5	.6	.4	1.3	.5	.3
G. S....	1.3	1.4	1.4	.7	.8	1.1	1.1	.6	.3	.6	1.1	.7	.5	.5
M. W....	1.1	.8	1.0	1.8	.9	1.1	.9	.7	.6	.9	.9	.8	1.4	.7
E. G....	1.4	1.0	1.2	1.5	2.5	1.5	2.8	1.1	1.5	.5	.6	1.3	.5	.5
Ave. ....	1.4	1.0	1.0	1.1	1.7	1.2	1.1	.6	.7	.6	.8	.7	.9	.5

TABLE II. SINGING THE MAJOR THIRD.

	Unaided.					Aided.					Un-aided. Aided.			
	1	2	3	4	5	Ave.	6	7	8	9	10	Ave.	11	12
G. M....	2.4	1.5	1.3	1.1	2.9	1.8	.9	.8	.7	.8	.7	.7	...	...
P. N....	.84	5.6	1.0	2.5	2.1	3.8	1.4	1.0	1.0	.7	.9	1.1	1.9	1.0
D. S....	1.5	2.1	2.8	.6	3.3	2.1	1.0	.8	.6	.9	.8	.8	5.2	.8
C. S....	1.1	1.5	3.4	2.2	1.0	1.8	2.2	1.0	1.5	1.2	2.0	1.6	2.2	1.2
M. W....	5.3	3.3	1.6	3.7	4.5	3.7	1.5	.8	1.1	1.2	1.7	1.3	3.3	1.2
E. G....	4.3	2.4	4.2	2.5	5.4	3.8	4.5	2.5	3.2	2.1	1.8	2.8	1.7	2.1
Ave. ....	3.8	2.7	2.4	2.1	3.2	2.8	1.9	1.1	1.3	1.1	1.3	1.4	2.9	1.2

TABLE III. SINGING THE FIFTH.

	Unaided.					Aided.					Un-aided. Aided.			
	1	2	3	4	5	Ave.	6	7	8	9	10	Ave.	11	12
G. M...	1.5	2.4	3.5	6.1	2.1	3.1	1.3	2.2	1.7	2.5	1.2	1.8	...	...
P. N...	2.4	9.3	2.5	3.4	4.2	4.0	1.6	2.9	1.6	.5	3.2	2.0	7.3	1.4
D. S...	3.4	6.2	6.7	3.1	5.8	5.0	1.4	1.5	1.1	1.1	1.3	1.3	5.3	2.2
C. S...	2.1	1.1	1.7	3.3	.8	1.8	1.5	.9	1.5	1.4	.9	1.2	4.5	2.2
M. W...	4.4	4.6	2.6	3.8	4.3	3.8	1.6	1.7	1.7	2.2	2.1	1.8	4.5	1.6
E. G...	1.8	1.0	2.4	2.4	2.8	2.1	3.0	2.3	3.1	.7	.5	1.9	2.4	1.4
Ave. ....	2.6	4.1	3.3	3.7	3.7	3.5	1.8	1.9	1.8	1.4	1.5	1.7	4.8	1.7

TABLE IV. SINGING THE OCTAVE.

	Unaided.					Aided.					Un-aided.		Aided.	
	1	2	3	4	5	Ave.	6	7	8	9	10	Ave.	11	12
G. M. . . .	2.8	5.6	2.6	2.1	7.0	3.9	1.7	2.2	1.8	2.3	1.4	1.9	2.3	1.1
P. N. . . .	5.9	2.2	1.9	2.5	5.9	3.7	.5	2.7	1.4	1.4	1.0	1.4	2.3	1.1
D. S. . . .	4.1	10.6	13.0	11.5	6.3	9.1	2.5	1.5	1.2	1.4	1.9	1.7	6.0	1.4
C. S. . . .	1.5	2.5	2.3	3.2	1.6	2.2	1.8	.7	1.0	2.0	.3	1.2	4.5	2.5
M. W. . . .	8.2	4.9	2.8	4.9	5.5	5.3	1.4	1.0	1.8	2.0	1.4	1.5	5.5	2.5
E. G. . . .	6.1	2.1	2.5	3.9	5.6	4.0	7.2	4.0	5.0	1.8	.7	3.7	2.9	3.3
Ave. . . .	4.8	4.7	4.2	4.7	5.3	4.7	2.5	2.0	2.0	1.8	1.1	1.9	4.2	2.2

TABLE V. MINIMAL CHANGE ON THE FUNDAMENTAL.

	Unaided.						Aided.						Un-aided. Aided.	
	1	2	3	4	5	Ave. %C	6	7	8	9	10	Ave. %C	11	12
G. M.....	1.8	1.4	2.1	1.9	1.8	1.8 96	1.5	1.4	1.4	1.2	1.2	1.3 98	...	...
P. N.....	2.2	2.1	4.5	2.4	2.8	2.8 97	2.2	1.9	1.8	1.9	1.2	1.8 93	1.4	1.4
D. S.....	1.5	1.3	1.9	1.7	1.5	1.6 98	1.1	1.0	1.0	1.3	1.2	1.1 92	1.0	1.0
C. S.....	1.0	1.2	1.1	1.0	1.0	1.1 96	1.0	1.1	1.1	1.1	.9	1.0 95	1.0	1.0
M. W.....	2.1	1.6	1.5	1.4	1.7	1.7 96	1.8	1.6	1.6	1.4	1.4	1.6 96	1.7	1.3
E. G.....	2.7	1.5	1.4	1.2	1.1	1.6 74	1.5	1.4	1.1	1.4	1.2	1.3 88	1.3	1.1
	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ave. ....	1.9	1.5	2.1	1.6	1.6	1.7	1.5	1.4	1.3	1.4	1.2	1.4	1.3	1.2

TABLE VI. MINIMAL CHANGE ON THE MAJOR THIRD.

	Unaided.							Aided.							Un-aided. Aided.	
	1	2	3	4	5	Ave.	%C	6	7	8	9	10	Ave.	%C	11	12
G. M.....	3.5	5.0	4.5	3.8	3.4	4.0	96	3.2	2.2	2.2	2.0	2.0	2.3	96	...	...
P. N.....	3.1	5.2	5.0	3.5	3.7	4.1	99	2.7	2.1	3.5	3.1	2.0	2.7	97	2.2	2.3
D. S.....	2.5	2.8	2.9	2.5	2.1	2.6	96	1.8	2.0	1.6	2.0	2.4	2.0	91	2.5	2.0
C. S.....	2.3	2.1	1.9	1.8	2.0	2.0	90	1.9	1.9	1.9	1.9	2.1	1.9	93	2.3	1.7
M. W.....	3.8	2.7	2.1	2.2	2.8	2.7	94	2.4	2.9	2.9	2.8	2.5	2.7	96	2.9	2.6
E. G.....	5.3	5.2	1.8	2.0	2.5	2.9	64	3.1	2.5	2.8	1.9	2.3	2.5	83	2.5	2.4
Ave. ....	3.4	3.5	3.0	2.6	2.7	3.0		2.5	2.3	2.5	2.3	2.2	2.4	..	2.5	2.4

TABLE VII. MINIMAL CHANGE ON THE FIFTH.

	Unaided.							Aided.							Un-aided. Aided.	
	1	2	3	4	5	Ave.	%C	6	7	8	9	10	Ave.	%C	11	12
G. M.....	1.9	3.4	2.5	2.5	2.5	2.6	99	1.4	1.3	1.3	1.1	1.6	1.3	97	...	...
P. N.....	2.8	4.2	3.3	2.7	3.1	3.2	99	2.1	1.6	1.5	1.1	1.3	1.6	98	1.5	1.4
D. S.....	1.4	2.3	2.5	2.1	2.1	2.1	100	1.1	1.2	1.5	1.3	1.1	1.2	98	1.3	1.2
C. S.....	1.2	1.3	1.4	1.5	1.2	1.3	96	1.5	1.4	1.2	1.0	1.2	1.3	98	1.3	1.2
M. W.....	3.4	2.4	1.7	2.6	2.2	2.5	97	2.1	2.1	2.4	2.5	2.4	2.3	100	2.4	2.2
E. G.....	4.4	1.8	1.5	1.1	1.4	2.0	65	2.2	1.8	1.8	1.4	2.1	1.9	92	1.4	1.4
Ave. ....	2.5	2.6	2.1	2.1	2.1	2.3		1.6	1.7	1.6	1.5	1.6	1.6	..	1.5	1.4

TABLE VIII. MINIMAL CHANGE ON THE OCTAVE.

	Unaided.							Aided.							Un-aided. Aided.	
	1	2	3	4	5	Ave.	%C	6	7	8	9	10	Ave.	%C	11	12
G. M.....	4.9	5.7	4.8	4.1	5.0	4.9	95	2.5	2.8	2.5	2.7	2.3	2.6	96	...	...
P. N.....	4.9	5.7	4.7	4.8	5.2	5.1	100	3.2	3.8	2.5	3.2	2.3	3.0	94	3.4	2.5
D. S.....	3.7	5.5	4.4	3.9	3.7	4.2	91	2.4	3.1	2.5	2.5	3.7	2.8	89	2.7	3.0
C. S.....	2.8	1.7	2.7	2.0	2.7	2.4	88	2.4	2.1	1.9	1.9	2.2	2.1	95	2.4	2.9
M. W.....	4.6	3.2	2.4	2.8	2.5	3.1	89	3.8	3.0	3.0	3.0	3.9	3.3	97	3.5	2.5
E. G.....	7.0	3.8	2.3	2.2	2.2	3.5	71	2.8	2.5	2.4	2.7	2.9	2.7	75	3.2	2.5
Ave. ....	4.7	4.3	3.5	3.3	3.5	3.9		2.8	2.9	2.4	2.6	2.9	2.7	..	3.2	2.5

In a preliminary experiment of this sort, we face a difficulty in the attempt to eliminate the element of progressive gain from the comparison of the two series, the aided and the unaided. As the curves show, the records vary from day to day, so that it is necessary to have several days in a series in order to obtain a fair average. Then, in order to obtain a measure of the natural ability in the unaided series, it is necessary to take that before the aided. Of course the thing to do in the future is to take a much longer series. But in view of the fact that the records for the second series fall on distinctly different levels, and that the evidence of progressive gain within a series is not pronounced, we may neglect this factor of progressive gain for the present purpose, provided we draw no finer distinctions in our conclusions than this neglect would permit. In the following con-

densed statements of conclusions, reference is made merely to the averages. The reader can readily trace the individual peculiarities in the tables. The necessary brevity of this article prevents us from discussing each item in detail, both as to method of procedure and results. Except where otherwise specified, unaided refers to the first five days, and aided to the second five days.

1. The aid enhances the ability to strike a tone which has been heard. See Table I and Figure I. The superiority of the aided series over the unaided amounts to 42%.

2. The aid enhances the ability to sing an interval. See Tables II, III and IV, and the corresponding curves. The superiority of the aided series over the unaided amounts to 50% for the major third, 50% for the fifth, and 60% for the octave.

This involves two factors; namely (a) ability to strike the tone heard or imaged, as in I, and (b) the efficiency of the memory image of the interval. If we assume that the difficulty of striking an imaged interval represents the same degree of difficulty, as the striking of the fundamental tone, we may get a measure of the gain in the accuracy of the memory image by subtracting the 42% gain, Table I, from the gross gain from the respective intervals, namely, 50%, 50%, and 60%, which leaves a gain of 8% for the major third, 8% for the fifth, and 18% for the octave, to be attributed to a correction of the image of the interval.

3. The voluntary control of the pitch of the voice is improved by the aid. See Tables V, VI, VII and VIII and the corresponding curves. The average superiority of the aided series over the unaided for all intervals amounts to 26%.

4. There is probably some transfer of gain from the aided training to following unaided singing. Compare records for the unaided series with those of the eleventh and twelfth days, Table I and Figure I. This is, of course, a most vital point. If the gain were not transferred to singing without aid, it would lose its principal value.

5. There is no evidence of transfer of the gain in the accuracy of the memory image. See Tables II, III, and IV and the corresponding curves. This is undoubtedly due to the fact that we have here to do with memory rather than discrimination and the acquisition of accurate memory images is a slow process—too slow to show in this short series.

6. The gain in the discriminative control of pitch of the voice is fully transferred. See Tables V, VI, VII and VIII and the corresponding curves.

7. Improvements in the ability to strike a tone, or an interval, and the ability to produce a minimal change, are very much more pronounced and more rapid in the aided than in the unaided series. See all the curves.

These seven points answer the first question which we asked at the outset: by the use of the tonoscope we facilitate in a decided manner the ability to sing in true pitch and the improvement is almost immediate.

8. The second question is not answered absolutely by our records, but it seems probable (1) from the radical and immediate improvement of the aided series over the unaided, and (2) from the introspection showing that a tone which without the instrument seemed entirely satisfactory to the ear could be corrected by the ear after the error had been pointed out by the instrument, that a higher degree of accuracy of pitch in singing may be attained by aiding the ear in the training than would be possible to attain without such aid. No matter how keen the ear of a trained musician, it can be shown in a single test that his ear has been “too generous”—too easily satisfied, for when the error is pointed out objectively he can recognize it. We thus find accumulative evidence to show that the singer cannot reach the physiological limit of accuracy by the ordinary methods of vocal culture, because he has no objective criterion by which he can check up the accuracy of the ear.

9. The major third, the fifth, and the octave are approximately equally difficult intervals to sing. If we express the

average error in relative fractions of a tone ( $1/25$  of a tone) instead of in vibrations, the ratio is 1.4, 1.5, and 1.4, for the three intervals as named above. The average error expressed in terms of vibrations, as in the tables, shows that the difficulty of a natural interval varies approximately with the magnitude of the interval.

10. The minimal change is a relatively constant fraction of a tone within this octave. This is true for both the aided and the unaided series. If we reduce the records in Tables V-VIII from vibrations to twenty-fifths of a tone, the minimal change is 3.1, 3.1, 3.6, 3.3, for the fundamental, the major third, the fifth and the octave respectively. This is surprising, because within this part of the tonal range the pitch discrimination is normally measured by a constant vibration frequency instead of by constant part of a tone. Experiments are in progress to verify this finding for singing over a larger tonal range.

11. Our experiments have demonstrated that we have, in the methods and instruments here used, very satisfactory means of measuring accuracy of singing without waste of time and without hampering the singer. A vast field for psychological and musical experimentation is hereby opened up. The facts outlined above have not only a theoretical interest but a practical value.<sup>1</sup> What will the music conservatory say about it? The situation is unique. The pedagogical principle involved is radically new in music. The instrument is a fundamentally new conception. It involves an expense to the vocal studio.

<sup>1</sup> For a discussion of the use of the tonoscope in the conservatory of music, see "*The Musician*," Volume 51, July, 1906.



# AN EXPERIMENT ON METHODS OF TEACHING ZOOLOGY.

(PRELIMINARY REPORT.)

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*Note by the Communicator.*—The following paper is the preliminary report of a series of investigations that are being undertaken by the School of Education of the University of Illinois to determine the relative merits of the pure-science and applied-science methods of approach in the teaching of secondary-school science. This question has long been a source of controversy among high-school teachers. It will be noted that the present study has been undertaken not to determine the relative influence of the two methods of approach upon the later, economic adjustments of the pupil, but rather to determine whether the economic approach will or will not influence the disciplinary or cultural outcome of his science work. In other words, the pure-science and applied-science methods of approach are both tested by a pure-science standard. Similar tests are being undertaken during the present semester in the teaching of botany, and it is planned to continue them in connection with physics and chemistry. It is understood, of course, that the ultimate validity of conclusions reached by the application of the method herein described will be strictly conditioned by the degree in which the "personal equation" of the experimenter is amenable to control. This problem can be solved only by a careful analysis of the results of repeated experiments.—W. C. B.

## SUMMARY OF RESULTS.

1. The results are only suggestive, in view of the small number of individuals tested. Even allowing for the probable error, however, the applied-science method of approach to the study of secondary-school zoölogy appears to have a slight advantage over the pure-science approach, when tested by examination-grades (the examination being of

the pure-science type). When tested by average semester grades, the applied-science approach shows a somewhat greater advantage. When tested by the per cent. of pupils averaging more than 85 per cent. in the semester's work, the applied-science approach has a slight but appreciable advantage.

2. When tested by the ability of the pupils to set up experiments and interpret phenomena (a cultural and disciplinary standard), the applied-science approach has a decided advantage.

3. When tested by the interest aroused as revealed in the voluntary "outside" reading of the pupils, the results are uncertain.

4. The method of investigating class-room problems by comparing the progress of parallel groups of pupils promises to yield valuable results, but it should be carefully studied, and its technique refined through repeated tests.

#### I. PURPOSE OF THE EXPERIMENT.

The following experiment is an effort to contribute some definite and tangible data for the solution of the problem of the relative merits of these two methods of approach to the study of zoölogy.

#### II. METHODS AND RESULTS.

The method of conducting the experiment, by the use of parallel groups (employed perhaps most notably by Winch in his memory investigations), is comparatively new, and should prove of service in questions of method of teaching such as the one under consideration.

The experiment was performed in the Academy of the University of Illinois during the first semester, 1909-10. Two sections of the class of beginners in zoölogy were used. These sections were approximately equal in size. They used the same laboratory and apparatus, the same text-books and laboratory guides, and were both taught by the writer. The same subject matter was covered, and the same examination

questions and tests were given to both groups. No selection of students for either section was attempted. Furthermore, the students were not informed of the experiment either upon registration or during the semester. They could not, therefore, choose one section or the other because of individual preference.

The data summarized below seem to indicate that the two sections were fairly equal with respect to distribution of sex, age, former environment, and professional bent. In computing the averages one student (42 years old) was not considered.

*NUMBER IN SECTIONS:* A, 17

B, 15

*DISTRIBUTION AS TO SEX:* A—boys, 15; girls, 2

B—boys, 13; girls, 2

*AGE:*

*Average age*—A, 18.7 (average variation, 1.0)

B, 19.1 (average variation, 1.7)

*Median age*—A, 19

B, 18

*FATHERS' OCCUPATIONS:*

A—agriculture, 6; medicine, 1; other occupations, 10

B—agriculture, 6; medicine, 0; other occupations, 9

*STUDENTS' FORMER OCCUPATIONS:*

A—4 have worked on the farm; 5 in other occupations

B—4 have worked on the farm; 5 in other occupations

*STUDENTS' INTENDED OCCUPATIONS:*

A—agriculture, 1; medicine, 3; other occupations, 13

B—agriculture, 0; medicine, 2; other occupations, 11; undecided, 2

Throughout this report the so-called cultural and disciplinary group is known as Section A. The enrollment was 17—15 boys and 2 girls. It recited from 8 to 10 a. m. The so-called economic group is called Section B. The enrollment was 15—13 boys and 2 girls. It recited from 11 a. m. to 12 m., and worked in the laboratory from 1 to 3 p. m. It should

be noted that Section B recited at a period of the day not so favorable for the best work as that used by Section A. (Cf. Burgerstein and Netolitzky: *Handbuch der Schulhygiene*, Jena, 1902, p. 572.)

A brief statement of some of the differences in approach and treatment of some topics used will best explain the method of conducting the experiment.

*Illustrative Details of Methods of Instruction.*—In studying the mouth parts of insects, Section A inquired as to the significance of these structures and adaptations in enabling the possessor to maintain its existence and be successful as a living creature. Section B made the same inquiry, but dwelt upon this significance for a shorter period and asked at some length the economic importance of these structures and their adaptations to the destruction of crops and property and to the spread of disease.

Section A visited a market garden and found aphids upon the vegetables, particularly upon cabbage plants. They studied such points as the great numbers, wide distribution, rapid multiplication, suctorial mouth parts, parthenogenesis, etc., of these creatures as factors which make them successful as a species. Section B found the same aphids and discussed the same points more briefly. They then considered the extent of the injury done in the garden and how parthenogenesis, rapid reproduction, and wide distribution of aphids contribute to the destruction of vegetables and other crops. Section A discussed the sucking mouth parts of aphids, squash bugs, and other Hemiptera as adaptations which enable these insects to employ a particular method of obtaining food from beneath the epidermis of the food-plant or animal. Section B noted the same points, but gave considerable time to a discussion of the fact that this particular type of mouth parts is responsible for the very large number of exceptionally injurious species to be found in this order, such species, for example, as plant lice, scale insects, squash bugs, cicadas, chinch bugs, bed bugs, etc. In this connec-

tion it was pointed out that the arsenical stomach poisons used effectively against the Colorado potato beetle and similar insects with biting mouth parts are of little service against this group with beaks, which may pierce the epidermis of the plant and suck the juices from beneath the coat of poison. Therefore, if the Hemiptera are to be destroyed artificially, it must be in some other manner, as by contact poisons in the form of washes and sprays, or by the fumes of poisonous gases. It is manifestly far more difficult to place poison in contact with each individual insect than to spread it upon vegetation where biting jaws would devour it. In the study of the mouth parts, then, the economic section saw a partial explanation of the large per cent of Hemiptera which are both injurious and difficult to control. This discussion was followed by a brief study of methods of controlling injurious Hemiptera.

Section A observed the lady bird devouring aphids to satisfy its appetite and maintain its existence. Attention was called to the fact that the little insect gives off a fluid which is distasteful to birds, toads, etc., which might otherwise feed upon it. The class observed that the lady bird is conspicuously marked, and, remembering that it is unpalatable, concluded that this might well be considered a warning coloration. Section B noted the little beetle devouring aphids, and, knowing the harm done by plant lice, at once concluded that the lady bird is exceptionally beneficial to man. They discussed, also, the bad tasting fluid which repels enemies, and noted the conspicuous color, but looked upon these provisions as fortunate means of protecting the very valuable little creature from destruction by predaceous animals.

Section A found tomato worms and noted their food, their color corresponding to the foliage, their means of holding on to the stems, the parasitic Hymenoptera emerging from the caterpillars, and the weakened condition or death of the tomato worm as a result. Section B noted all these points, but estimated the damage done to the patch of tomatoes, figured the per cent. of parasitized forms, and concluded that

a very large per cent. of these insects are killed by the parasite, and that the ultimate damage done by them is perhaps correspondingly diminished.

The tongues of the frog and toad were discussed by Section A as organs especially adapted in point of attachment and in structure for obtaining insects used as food. Section B looked upon the organ as one not only enabling the toad to get its own food, but also as one which fortunately enables the toad to perform great service to man by destroying injurious insects on farms. Section A observed the extensible horny-tipped tongue of the woodpecker as a structure used to spear and extract the grubs from the trees after the chisel-like beak has made the opening in the bark. Section B saw in this structure a means not only of obtaining food for the bird, but also a means of saving our forest and fruit trees from grub and borer injury to the amount of many million dollars annually.

Section A discussed bird migration, noting its causes and its effects upon the bird population of the region and upon the species migrating. Common birds were classified as permanent residents, summer residents, winter residents, transients and accidental visitors. Section B discussed the effect of migration upon the food of the bird, and on the insects and weed seeds destroyed in a given region. If a bird's food habits are good, it is most beneficial in the locality if it resides there permanently. It perhaps is of next greatest value if it is a summer resident and nests in the locality. This is particularly true since young birds are so frequently fed upon injurious caterpillars and grubs. Each group of migrants was discussed with reference to the value of its individuals in an economic way. To Section B this classification meant in part, that a bird was of greater or less value on the farm and in the forest accordingly as it fell into one or the other of these groups.

In like manner Section A learned the distribution and number of birds in pastures, plowed fields, forest, etc., where they obtain the particular foods they most desire. Section

B learned this distribution and asked what significance it might have in holding in check the particular destructive insects found there.

The preceding examples, while not given in great detail, will indicate some of the differences in points emphasized in the two sections.

*Methods of Testing.*—Perhaps few experiments are more complicated than the one here undertaken. Numerous factors enter into the results, and some of these factors are not easily controlled. For example, by reason of previous training or occupation some students in Section A may have developed strong economic tendencies, which might easily serve as a source of interest in the study of biological forms. This would tend to minimize any real advantage gained by the economic section. Furthermore, much difficulty was experienced in the development of a technique. In fact, the solving the problems of method rather overshadowed the obtaining of definite data, and must continue to do so, in a diminishing degree, until the method of attack is perfected.

Results were compared mathematically upon:

1. The amount of zoölogical knowledge assimilated.
2. The power to set up simple experiments and to interpret phenomena.
3. The interest of the sections.

*The Examination Test.*—The amount of knowledge assimilated was tested in the usual way, by written examinations, the same questions being given to both sections. Every effort was made to avoid the economic element in the questions asked so that Section A would be under no disadvantage. The questions were made to cover the field of study pretty generally and to search the ground rather thoroughly. The final examination questions will serve as a type and were as follows:

1. Define the following zoölogical terms, and give an example of each: *mimicry*, *homology*, *analogy*, *instinct*, *intelligence*, *parthenogenesis*, *exoskeleton*, *endoskeleton*, *vertebrata*, *imago*.
2. Discuss the relation of insects to disease.
3. Discuss the relation of insects to flowers. (Omit discussion of the milkweed studied in the laboratory.)
4. Give the life histories of the *mosquito*, the *housefly*, and the *frog*.
5. Define *evolution*, *natural selection*, *hybrid*, *dominant*. State Mendel's law of heredity as it applies to white and grey rabbits.
6. Compare the respiratory and circulatory systems of the *locust*, the *crayfish*, the *frog*, the *bird*, and the *rabbit*.
7. Give characteristics and examples of: *Orthoptera*, *Odonata*, *Hemiptera*, *Coleoptera*, *Diptera*, *Hymenoptera*.
8. To what class and order does each of the following animals belong: *Ostrich*, *owl*, *bob-white*, *cat*, *horse*, *crayfish*, *green-frog*, *butterfly*, *black-snake*, *man*?
9. Define *carapace*, *cephalothorax*, *somite*, *exopodite*, *palpus*, *metathorax*, *ocelli*, *gastric mill*, *cheliped*, *cerebrum*, *amoeba*, *arthropoda*.
10. What animals can you find abundant in the fall in cabbage fields and gardens, in weed and stubble fields, in stagnant, filthy water, such as that near the Smith Packing House, in the dredge ditch, in a dusty road? (Recall your field trips.)

*Results of the Examination Test.*—The examination papers were numbered and the grades recorded before the names of students holding these numbers were known to the instructor. This was, of course, done to eliminate the personal equation in judging results. Section A made an average grade of 72.5% on the final examination, while Section B made an average grade of 73.2%.



*Results of Comparing Semester Grades.*—The average semester grade for all subjects other than zoölogy of the students in Section A is 80.35%. In zoölogy the average of the same students for the semester is 81.53%. The average semester grade of the students in Section B in all subjects other than zoölogy is 78.47%. In zoölogy their average for the semester is 82.73%. Section A, then, has an average in zoölogy which is 1.18% higher than their average in other subjects. Section B has an average in zoölogy which is 4.26% higher than the average in other subjects. In all subjects other than zoölogy Section A has an average which is 1.88% higher than that of Section B. In the final examination, however, Section B has an average grade which is 0.7% higher than that of Section A. After calculating the probable error in all the data obtained, a very slight advantage appears in favor of the economic approach. While this advantage is too small to warrant any final conclusions upon a single trial of the experiment, it does warrant the conclusion that the experiment is worth repeating with the hope of obtaining more conclusive data as the technique is perfected.

*Results of Comparison of Pupils Averaging Over 85%.*—Viewed from another standpoint, the grades are even more interesting than is indicated above. The per cent. of students making above 85 was 29.4 in Section A and 46.6 in Section B. The per cent. making from 75 to 85 was 41.1 in Section A and 33.3 in Section B. The per cent. making from 70 to 75 was 23.5 in Section A and 13.3 in Section B. This seems to point to a rather clear advantage for Section B. However, if this advantage exists in a rather marked way as indicated in these figures, it may be asked why the average of Section B is so little above that of Section A. The fact of the matter is that in Section B there was a case of premature love-sickness, a thing which high-school teachers will admit is difficult to control so long as the parties are thrown together in the class. Perhaps no method of

presenting subject-matter will greatly influence such cases. These two students materially lowered the average of Section B.

Frequency curves, not published in this preliminary report, were plotted both for the examination grades, and for the pupils averaging over 85. They show a uniform advancement of the "stations" of the various groups in Section B, as compared with analogous groups of Section A, while the frequency curves for grades in other subjects show the inverse relation.

*The Test for Ability in Experimentation and Interpretation; Its Results.*—The following is an example of the method used to test the ability of students to set up experiments and interpret the phenomena. The supply table was provided with all necessary containers and apparatus for transfer of materials; with thermometers, food materials, etc., for the experiment. Mosquito larvae of uniform age and size were placed on the table, and the classes were directed to determine by experiment the effect of abundance and scarcity of food supply upon the rapidity of growth and development of mosquito larvae. The individual student was then required to write out a detailed account of the steps to be taken and present this for approval. This precaution prevented the possibility of students getting suggestions by seeing other students at work on the same problem. Defects such as failure to specify that the containers in the experiment must be placed under the same temperature and light conditions were checked against the student, and he was required to make a second report. Of students in Section A, 35% reported correctly on the first trial, and 47% more were correct on the second report. Of students in Section B, 60% reported correctly on the first trial, and 33% more were correct on the second trial. This gives an advantage on first reports in favor of the economic section.

*The Test for Interest and Its Results.*—As to interest, while the writer is confident that much the greatest advantage in favor of the economic section was found here, he does not care to represent this difference in mathematical terms until he has better control of some of the factors involved. Readings from Burroughs, the Peckhams, Darwin, Huxley, Wallace, DeVries, Jordan, Kellogg, etc., were assigned to Section A. Readings from numerous bulletins from the Department of Agriculture at Washington and from the state experimental stations were assigned to Section B. Records of voluntary readings by the two sections were somewhat vitiated by the fact that books wanted were frequently in use by other departments of the University. Figures are, therefore, not given on this point. Interest, however, both in the regular class work and discussions and in the outside work seemed to be greater in the economic section, and it was here that the results seemed to be most favorable to the economic approach. More definite and reliable data can be obtained on this point in future experiments.

### III. CONCLUSIONS.

One chief concern of the writer in performing this experiment was to satisfy his own mind as to the feasibility of getting data of real value by this method of experimentation. The only definite conclusions which the experiment justifies are that the method, with such modifications as experience will bring, can be applied successfully, and that the problem of the relative merits of methods of approach to zoölogy is worthy of serious consideration and experimentation.

During the present semester the writer is continuing the experiment, under some difficulties, on two sections in botany. It is intended to repeat the experiment in zoölogy next year in the light of the experience gained in this first attempt. Some modifications will certainly be made, but it was deemed best to give the account just as the experiment was performed, and without comment as to either the stronger or the weaker features involved.

The writer is very anxious that other teachers interested in this type of pedagogical problem should try the method here suggested, and that they should contribute first to the development of the needed technique, and finally to the determination of the best method of approach to the study of biology.

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The Ministry of Education in Prussia is making an interesting attempt to bring the primary and secondary schools into closer relations with each other. The principal of the secondary school is to visit the primary schools in his locality from time to time, give suggestions and advice to the directors and teachers of these schools, and preside over the promotion examinations. This will tend to secure greater harmony in the methods and work of the two schools, and will facilitate the passage of pupils from the one to the other. The plan is worthy of imitation in this country, and might greatly increase the efficiency of our elementary schools.

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In the Berlin Teachers' Association a section has been organized for the experimental study of pedagogical problems. In its "program" the section recognizes the dependence of a scientific pedagogy upon the methods and investigations of child and experimental psychology, but calls attention to the fact that the period of child development from the ages of 6 to 14, the period of the greatest importance for the teacher, has been very little studied. This field offers alluring opportunities for the psychologically trained teacher, and the section will devote its energies to the organization of appropriate investigations and to the collection and publication of their results.

## AN EXPERIENCE WITH CORRELATION AND THE CLASS EXPERIMENT.

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Encouraging results in teaching by the writer have followed emphasis upon: (1) definite correlation of the introductory course in psychology with basal studies, and upon (2) the class experiment. Welcome to him, therefore, is the suggestion of Professor Seashore (this JOURNAL, Jan., 1910), that psychologists should co-operate to prepare a series of exercises suitable for class-room use. He says there are four ways in which we may teach psychology by experiment: (1) the regular technical laboratory course; (2) the exhibition experiment before a class; (3) the individual experiment without apparatus; (4) the class experiment. This fourth way requires that the student should take active and responsible part in the experiment, that the experiment should be sufficiently intensive to make it vital, and each step must be explained and interpreted. Each of the four ways is valuable in its place, but it is evident to us that the class experiment offers superior merit.

Added to the needed application of the class experiment, a matter to which we shall return, it appears that an equally urgent need is a more vigorous readjustment of our curricula so that courses in psychology may not be undertaken except by students with a modicum of preparation in physics, chemistry and biology, as well as in history, literature and language. This conviction is the result of some years' trial of different methods of instruction in psychology, e. g., use of textbook, lectures, individual experiments—in dealing both with normal school and with college students,

who expect to teach. The experience of these years will be summarized in what follows, as: (1) preparation found appropriate for introductory courses in psychology; (2) a sample class experiment as adopted and justified in use.

1. Irregularity of preparation in students both of normal school and of college courses is due to manifold causes, such as: lax entrance regulations, differences due to age, capacity, health and sometimes to electives not safeguarded by wise grouping. Once a class is before us, the insufficiency of preparation is not easily remedied. If attacked in time, one remediable cause of unfitness for psychological study is the failure to correlate in advance the departments indicated. I have heard of students studying in the order named, as follows: educational psychology, philosophy and psychology, and afterwards chemistry, physics and perhaps neurology. One strong youth, a victim of such labor, confessed to me that his whole course seemed largely a maze of unrelated and half-forgotten details. To overcome by correlation a confusion of studies it seems would be something more than mere subservience to logical order; the principles of growth demand it. And for the sake both of economy and apperception the value of consecutive arrangement of courses aside from theory appears to us practical and certain, as the outcome of actual trials with groups of students with and without the benefits of such correlation. The arrangement of studies here noted has regard especially for the assimilation of psychology as a basis for educational theory, but the principle seems valid also when psychology is undertaken for other specific aims or for general culture.

The trials referred to concern three years' endeavor with normal school and with college students, in an institution which was practically a normal school having courses respectively of two and of four years, intended for the preparation of teachers for elementary and high schools. Local conditions, one of which was the failure of the state to provide any normal school, made it impracticable to eliminate sum-

marily the normal school courses; and on the other hand, the expectation of developing a true teachers' college with independent endowment made necessary the college work. The new George Peabody College for Teachers, which has received the expected endowment, will represent the culmination of the hopes in reference to a teachers' college.

Three years of transition and development in the old institution afforded the writer some opportunity to observe the effects of devices in his work of instruction. During the first year he was forced to receive students with slight uniformity of preparation. During the second year faculty legislation was secured which required of students upon entering psychology that they should have had about two quarters' work, including laboratory exercises, in each of the three sciences, physics, chemistry and biology (with stress upon the physiology of the nervous system). Average preparation in mathematics, history, literature and languages was also secured. Legislation further effected the separation of the normal school and the college work by formation of separate class-groups, and the standard of admission to the first was made  $8\frac{1}{2}$  Carnegie units and to the college 14 units. Hitherto the regular courses had been interchangeable for credit in either normal or college department. The distinction made in standards, the better grouping of students and the adaptation of the nature, quantity and quality of work respectively to the two general groups obviously were beneficial. The conditions were not altogether unique in America, although the causes thereof were unusual. They are recorded here as explanatory of our efforts for correlation as well as being suggestive possibly to institutions whose curricula remain in an undefined, confused state. Where summary amputation is impossible, an ameliorative treatment consists in the actual separation of classes and the correlation of studies, with regard for the specific aim of the institution.

Looking backward we know that the normal school year, with its rigid curriculum having no electives, was overcrowded. Semesters would have been better than quarters for the plan executed. Nevertheless the zeal and understanding manifest in the large elementary classes of psychology were better than hitherto. In the college psychology (Junior class) the results were gratifying in marked degree, as evinced by comparison of general observation of the relative character of habits and knowledge, as contrasted with those of previous classes; as well as by the criterion of class records. It is hoped also that the effect of the measures adopted will help the students to make good choices from the wide range of electives offered during the Senior year of the college course. The preparation and character of the class as a whole made it possible to utilize the class experiment more than heretofore.

The first quarter's work (twelve weeks) was followed by the course in educational psychology. The texts used during the first quarter were Ebbinghaus (Meyer) and Seashore. During the second quarter Bagley's *Educative Process*, supplemented by frequent reference to *Adolescence* (Hall).

2. The class experiment utilized with most benefit was an adaptation of Seashore's simple directions (*Elementary Experiments*, page 131) for the simultaneous use of the college class. There were fourteen students in the group. Upon a heavy white cardboard (43 x 91 cm.) pegs (brass pins) were glued in 24 different positions. Upon white cards (9 x 10 cm.) geometrical symbols were marked with blue ink. Another set of symbols was made by marking the back of same cards. Dennison's cloth suspension rings were used for hangers. A few familiar symbols, Greek letters, were purposely included, but the geometrical designs were generally different from Seashore's, which each student had seen perhaps in his book. The symbols with meaning of course served to bring out vividly in the data the factors of association and interest.





The procedure, including exposures, recording data, explanations, comparisons and discussions, occupied two weeks. We are still discussing some of the problems naturally evolved. Home-work consisted in assigned readings, and the making of calculations and of graphical representations. Care was taken with notebooks and habits involved; systematic records were exacted; the data were grouped separately on the pages from the opinions, inferences and problems. In the class the method was: on the first day, after distribution of eight blank papers to each student, and following careful instruction as to procedure, records and evaluation of results, eight successive exposures were made, each of 15 seconds, with intervals of two and one-half minutes for writing the remembered symbols. (Fig. I.) The papers after each interval were put out of sight. The grading agreed upon was: value of five per cent was given to a correctly made symbol in right order; a value of two and one-half per cent for a correctly made symbol in wrong order. The remainder of the hour was devoted to recording introspections. On the second day the experiment was repeated with same symbols grouped differently. (Fig. II.) The third day was spent in comparing introspections and in the examination by the class of the graphical representations (made by the students) of the results of the two tests. The curves were tacked upon the wall temporarily in order to expedite comparison of results and the study of individual differences. The introspections revealed the random processes of some students as contrasted with the devices used by others in memorizing, and also some interesting facts concerning imagery. The whole and the part methods were discussed. The students were urged to do better on the morrow when an entirely new set of symbols would be used. It was expected incidentally that because of the practice and the ideals inculcated so far, that some improvement would be shown in reproducing the third new set of symbols (Fig. III.) The record (Fig. IV), a reproduction of one made by a student, is typical and indicates a failure to register marked improvement with

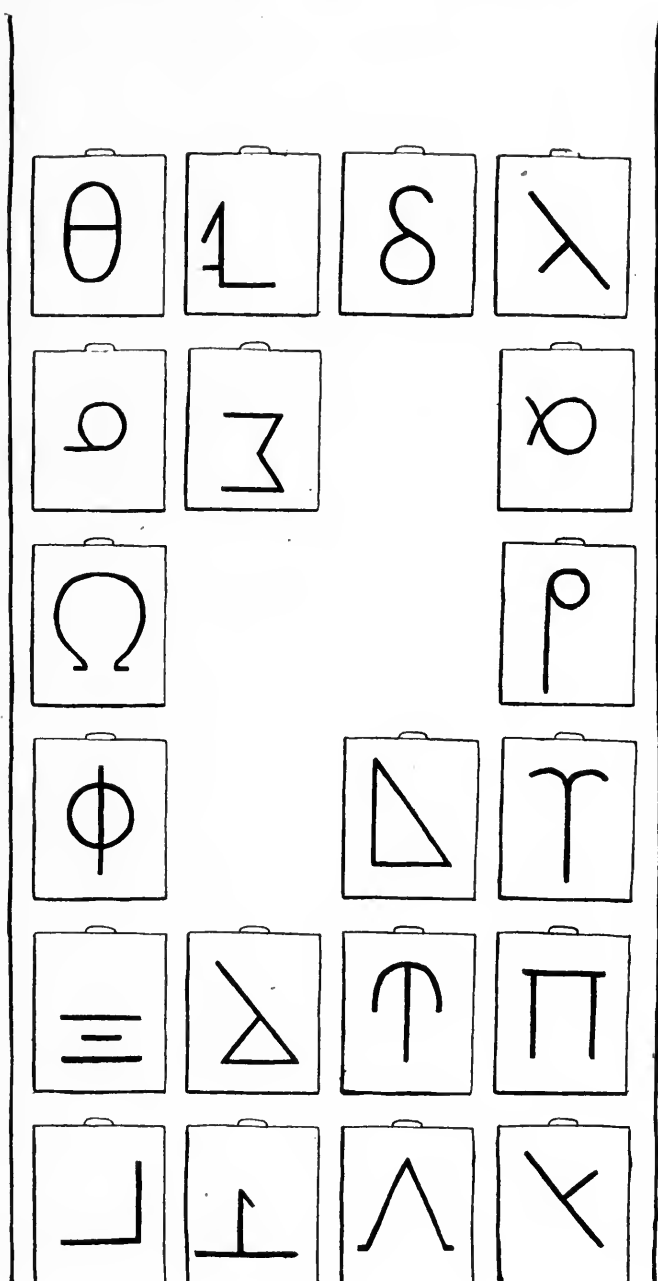


FIGURE II.

the new material. This failure may be due to the greater difficulty of the third set, which therefore demanded more time for reproduction. The lines A, B, C in this record represent for one student the data of the three groups of tests in the order named. The lack of improvement brought up questions which concern the problem of formal discipline, and opportunity was given to call attention to the numerous experiments upon the effects of special practice.

The second week was occupied in formulating some of the problems suggested in the course of the experiment, such as: "impression, retention, recollection, recognition," and the factors of repetition, recency, interest, fatigue and of association. One or two of these were elaborated by means of another class experiment. E. g., to exemplify the factor of association a mnemonic device of our own contrivance was used so that each member of the class was enabled, in spite of frequently expressed initial feeling of inability to perform the task, to repeat accurately in any order a list of disconnected words spoken to the class but once. After the feat, careful explanation was given and received with eagerness concerning: (1) the general history of mnemonic systems; (2) the impracticability and fraudulent nature of advertised "systems of memory training"; (3) the actual working of the associative function, in this case without repetition.

One could hardly claim that the getting of reliable data is the prime aim of this class experiment. But we secured in some students a measure of appreciation of the scientific method; a spirit of co-operation more intense than rivalry; perhaps some discipline in certain habits of attending; considerable information, and the class was agreeably stimulated—as no mere text-book memorizing had stimulated—to an attempt to formulate naturally the problems of the memory processes. Spontaneous inquiries were evoked, co-operation, interest and work were the rule. Finally, the complete record of each student—the data, curves, introspection, tentative conclusions and the digests of home reading—were examined by the instructor.

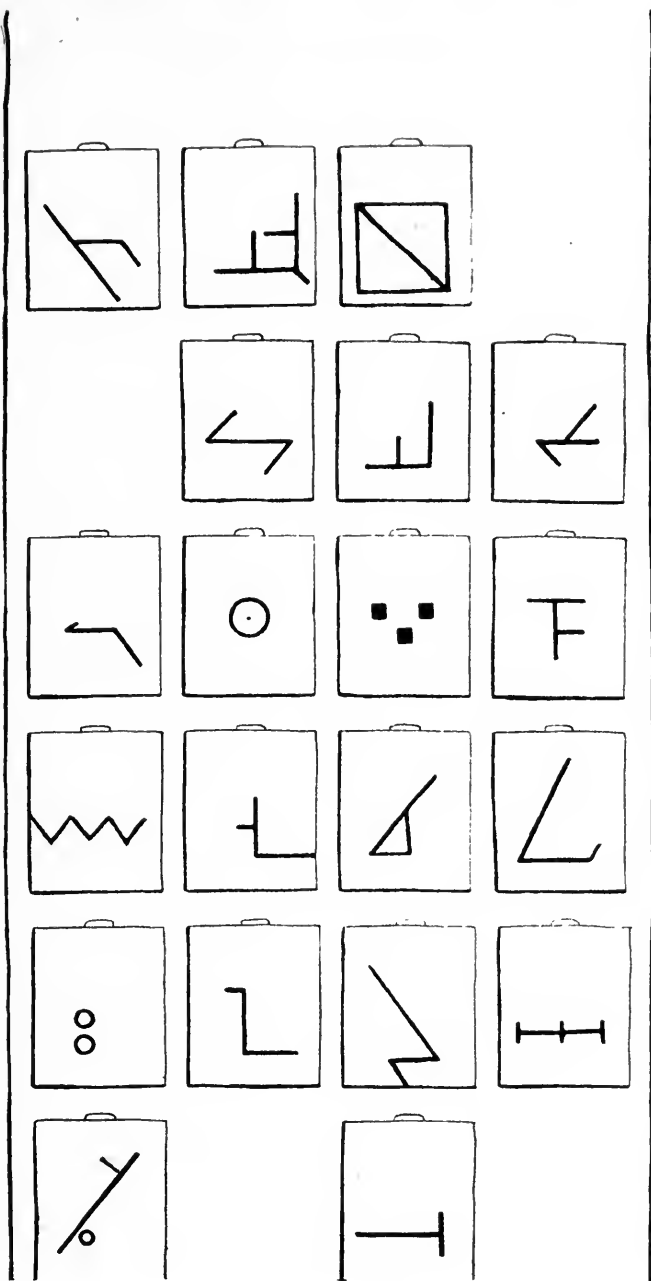


FIGURE III.

The fruits of educational psychology need more testing in the psychological class room. The writer has heard of teachers of educational psychology who are neglectful of the ideals and principles they serve up to the teacher of the three r's

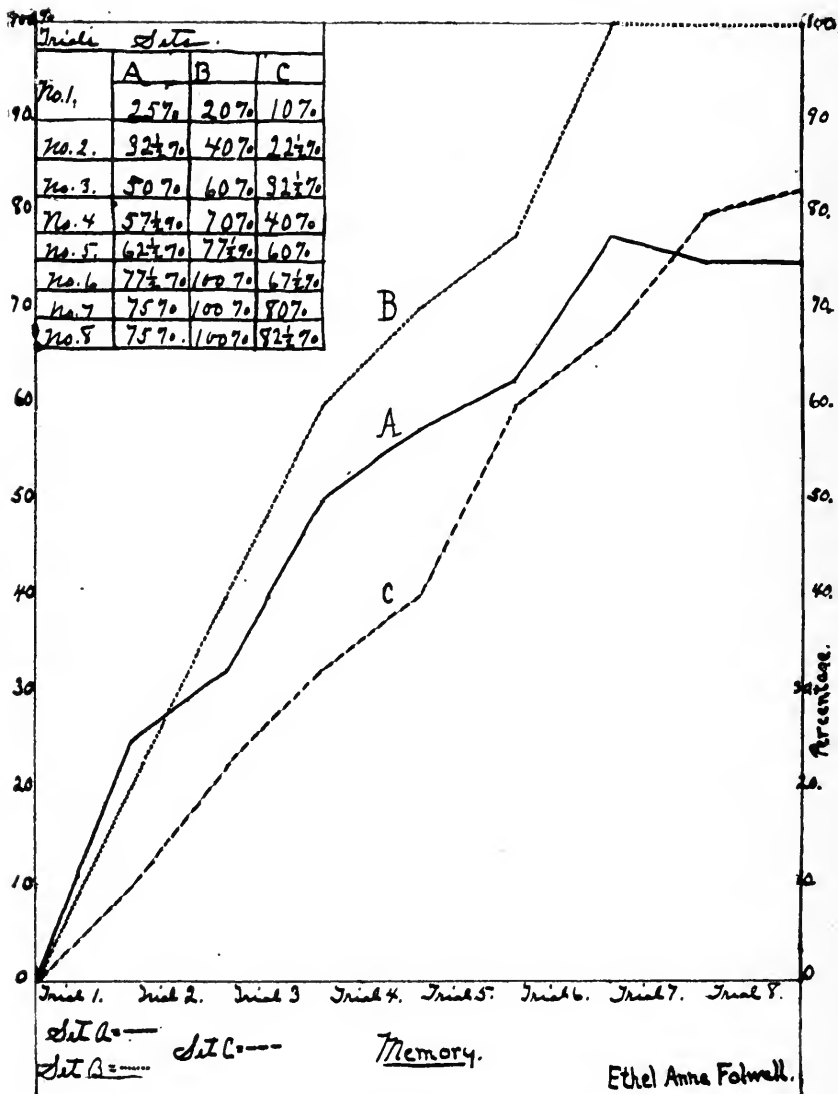


FIGURE IV.

or of Latin and algebra. For the sake of both efficiency and of consistency cannot the movement which supports this journal have first effect in the renovation of our own teaching? The above account is offered humbly as a record of one teacher's groping after better methods of teaching psychology under handicapping conditions. Possibly it may provoke someone to point out to him and fellow sufferers a better way.

If it seems to the reader that undue enthusiasm has been manifested for the class experiment, let it be recalled again that the excellent preparation of the student in the basal sciences cleared the way for an easy entrance into psychology. The teacher, after the reform, had to consume little time in pausing to describe a simple spectrum, or the working of an electro-magnet or to give a working definition of a neurone or of metabolism. Actual correlation is as important a factor in the teaching of psychology as is the valuable class experiment.

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President Schurman, after a study of the list of 135 men dropped from Cornell in February of this year on account of unsatisfactory work, reports that the fraternity men show almost twice as high a percentage of failures as the non-fraternity men. Among the fraternities themselves there are great differences in the matter of scholarship. Of the thirty-seven national and local fraternities at Cornell eleven did not have a single failure, while in eight the failures ranged from 10% to 17%.

## COMMUNICATIONS AND DISCUSSIONS.

### SOME INVESTIGATIONS OF HABITS OF STUDY.

In the investigation of the problems of education how should the judgments or conclusions be made? "In the first place it is obvious that it [accurate judgment] can only be based on a clear knowledge of the facts, on an appreciation of their sequence and relative significance. The facts once classified, once understood, the judgment based upon them ought to be independent of the individual mind which examines them . . . . The scientific man has above all things to strive at self elimination in his judgments, to provide an argument which is as true for each individual mind as for his own. *The classification of facts, the recognition of their sequence and relative significance is the function of science*, and the habit of forming a judgment upon these facts unbiased by personal feeling is characteristic of what may be termed the scientific frame of mind." (Pearson's "Grammar of Science," p. 6.) If, then, educational conditions or problems are to be investigated scientifically there must be something more than the gathering of data and the drawing of conclusions. In order that the conclusions may be valuable the data must be collected very carefully; the manner of the collection explained fully; the condition of each investigation (where the results of the succeeding are to be compared with the preceding) duplicated exactly; liability to create false conditions must be recognized and guarded against; the danger of being blinded to real conditions by a desire to prove a theory must be avoided; and the enthusiastic or cold presentation of one side or the other of a subject eliminated.

Prof. F. M. McMurry in his book, "How to Study and Teaching How to Study," pages 5 and 6, quotes figures that are startling. His material was gathered from investigations of the subject of Study in the Grades, conducted during the last four or five years by Dr. Lyda B. Earhart. Two paragraphs are quoted: "Out of 842 children who took this test only fourteen really found, or stated that they had found, the subject of the lesson. Two others said that they *would* find it.



Eighty-eight really found, or stated that they had found, the most important parts of the lesson; twenty-one others, that they *would* find them. Four verified the statements in the text, and three others said that they *would* do that. Nine children did nothing; 158 did not understand the requirements; 100 gave irrelevant answers; 119 merely thought, or tried to understand the lesson, or studied the lesson, and 324 simply wrote the facts of the lesson. In other words, 710 out of 842 sixth and seventh grade pupils who took the test gave indefinite and unsatisfactory answers. This number showed that they had no clear knowledge of the principal things to be done in mastering an ordinary text-book lesson in geography. Yet the schools to which they belonged were, beyond doubt, much above the average in the quality of their instruction.

"In a later and different test, in which the children were asked to find the subject of a certain lesson that was given to them, 301 out of 828 stated the subject fairly well. The remaining 527 gave only partial, or indefinite, or irrelevant answers. Only 317 out of the 828 were able to discover the most important fact in the lesson. Yet determining the subject and the leading facts are among the main things that anyone must do in mastering a topic. How they could have been intelligent in their study in the past, therefore, is difficult to comprehend."

The fact that, in the first test, only 14 out of 842 really found or stated they had found the subject of the lesson, and in a later test 301 out of 828 stated the subject fairly well, is certainly startling. One is at once interested in the manner in which the tests were given. Inquiry by the writer revealed the fact that, at least in one of the rooms in which the tests were given, the conditions of the first test were not duplicated in the second. In the first test printed questions were presented to the pupils by the principal of the building. In the opinion of the teacher in charge of this grade these printed questions, given by the principal with no explanations, changed the natural free conditions the pupils had with the regular teacher. The pupils did not study as was their custom, they did not consult dictionaries or reference books as they did daily with the regular teacher in charge and therefore this first test was not a true test of the pupils' ability to study. The second test in this same room was given by the regular teacher in charge—when the normal conditions under which the pupils studied were restored. In this particular grade the pupils in the second

test consulted books of reference and dictionaries with the usual daily freedom. The atmosphere was not strained, there was no timidity, no fear, as there had been in the first test. It is to be noted that in the first test only 14 out of 842 children found the subject of the lesson, on the second test only 317 out of 828 were able to discover the most important fact in the lesson and 301 out of 828 stated the subject fairly well. If all of the tests were given in the way described, the question arises whether the improved results of the second test might not be due to the restoration of the normal conditions at the time the second test was given.

The teacher in charge of one of the rooms in which the tests were given is of the opinion that the investigators were anxious to prove a theory and, therefore, failed to observe all the requirements necessary to secure impartial results. They wished to be fair, they had no intention of creating a "situation," but they were prejudiced in favor of certain theories and the "situation" was created unintentionally.

Another teacher, in whose room these tests were given, states that the first test was given by a stranger, but "a part" of the second series of tests were given by herself "to economize time." In her opinion, "The only things that seemed to hamper the work were these facts; it was unusual for a strange man to give tests, and the fact that the directions were mostly printed on the papers, instead of being given orally." She further says the pupils in the second test worked more quickly and more intelligently under practically the same conditions, though no directions or explanations had been given since the first series of tests. Why? If no directions or explanations were given between the series of tests, why should the pupils work more quickly and more intelligently in the second than in the first? May it not have been due to the fact that the regular teacher and not a stranger was in charge? However, this teacher believes the conditions were perfectly fair, and without conscious or unconscious influences being exerted upon the class.

There is no disagreement with the statements that children waste time and energy in incorrect methods of study; that they need to be taught to study, or that they can be taught to study correctly. All this is true, and the books that will help to bring correct methods of study to the attention of teachers and create an awakened interest in this most important phase of teaching are valuable, but there is some doubt about the assumed present lack of ability to study on the part

of the pupils in the public schools. If the figures given in the two paragraphs quoted above are correct, teachers are securing marvelous results even though pupils cannot study. The question is, Do not pupils study better than the above figures state (though they should study more intelligently than they do now)?

A sixth grade, in many respects not up to the usual standard, in the training department of a state normal school was examined to see what preparation had been made for the reading lesson. The usual assignment was made by the teacher in charge, special care being taken that nothing out of the ordinary routine be suggested. The following day paper was given the pupils and they were asked to state what they had done in preparing the lesson which was to follow. Nineteen replies were received. Five pupils confessed they had made no preparation, because of lack of time. Of the fourteen remaining, eight, or 57+%, stated that they "read the lesson once," or "several times," without specifying how they read it. Two of the eight added they had looked up the words which they did not know. Another of the eight "tried to pronounce every word correctly," another "tried to get the pictures." The rest of the class, or 42+% :—

Read the lesson silently, then orally,  
Spent the most time on the hardest paragraphs,  
Tried to find out what the story was about,  
Noted the new words, then looked them up,  
Thought about the story with the book closed,  
Found the main idea in each paragraph,  
Read the lesson aloud just as well as possible to get the expression.

Of course, this is the result of an examination conducted in but one class and only fourteen papers were counted, but the results from these fourteen show that these pupils, at least, have better habits of study than the figures quoted by Professor McMurry would seem to suggest.

Again, 118 pupils, graduates of the eighth grade country schools, who had entered the normal school in September, were examined at the end of fifteen weeks' work to ascertain what preparation had been made for the reading lesson. The assignment was: "Prepare the lesson just as well as you possibly can," then the name of the selection to be read was given. At the next recitation paper was distributed and the pupils were asked to state what they had done to prepare the lesson "just as well as they possibly could." The tabulated results follow:

Read the lesson silently .....	62
Read the lesson, not stating how.....	23
Looked up unknown words.....	46
Applied the words after looking them up.....	19
Tried to get the thought.....	57
Thought about what had been read.....	34
Read lesson aloud.....	72
Read lesson trying to give thought to others.....	7
Looked for emotion.....	28
Looked for pictures.....	68
Looked for articulation.....	8
Looked for enunciation.....	7
Looked for punctuation.....	10
Looked for grouping.....	47
Only described facts in the story.....	7

The results of this examination of 118 students show that the habits of study are not quite so poor as one might conclude from the figures taken from Professor McMurry's book. Of course, one must remember these 118 pupils were older than the 828 examined by Miss Earhart, but one must also remember that many, at least, of those 828 were pupils in city schools, while the 118 pupils had studied only in the country schools. The only object in quoting the above figures is to suggest that in all probability the pupils in the grades are not so helpless when a task is given as we may be inclined to think.

If progress is to be made in education, information concerning the present conditions must be available, and the questionnaire is one good way of securing this information, but much care must be taken in presenting these questionnaires and in formulating conclusions from the statistics gathered by them. The purpose of this article is to suggest that more care in the gathering of school statistics may show that the schools are not in the horrible condition that some critics seem to think.

For one to attempt to discuss a subject in which one makes no claim to expertness may seem, suggests Professor Dewey, presumptuous. But the problem of teaching may be helped if "all of us frankly" . . . "state our own convictions, even if thereby we betray our limitations and trespass where we have no rights save by courtesy."

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## ABSTRACTS AND REVIEWS.

F. M. McMURRY. *How to Study and Teaching How to Study.* (Boston: Houghton, Mifflin Co., 1909. Pp. 324. \$1.25.)

This is one of the most interesting books in education written within the last few years. It is a masterly analysis of the art of study, a genuine contribution to the subject, and while the book is not precisely a pioneer, the scope and uniqueness of the treatment give it a solitary and commanding position in its field.

McMurry finds eight requisites of economic study. (1) The child must at the very outset feel a definite, *specific* purpose or need in his study—not the vague, *general* aim to acquire knowledge, culture, efficiency, power or skill, but some specific problem in the lesson assigned. This will supply a vital interest to energize effort, focalize and sustain attention; it will transform knowledge-getting from a mere collecting of facts at random to a discriminating choice of data relevant to the specific aim; and it will divert knowledge into practical channels. (2) Pupils should be taught to organize their reading matter around these leading points, and to subordinate the supporting data in the order of value. This involves keeping the central thoughts clearly in mind, the rapid gleanings or neglect of the unessential details, and the observance of a certain procedure in teaching. (3) Since the text must treat topics fragmentarily, require the child to reconstruct and supplement the text-book treatment by his own ideas and experiences. This requires the use of developmental instruction, texts with abundant details, emphasis on reflection as against verbal repetition, and versatility in methods of reproduction. (4) Children should be encouraged to assume a critical attitude toward what they read, and to pass independent judgments upon the credibility of the statements in print, owing to the fact that the latter are often exaggerated, one-sided, inadequate or false. (5) They should likewise assume an unprejudiced, tentative attitude toward knowledge, because many of our conclusions are possibilities or probabilities rather than established certainties, because our attitudes are so prone to become dogmatic and ultra-conservative, and because children incline to base their opinions on authority rather than reason. (6) Studying also involves memorizing, but its importance has been grossly exaggerated in past

educational practice and theory. It has been made the pack horse of education, becoming practically synonymous with studying, so that children have rebelled against the intolerable drudgery of school life. The drill likewise has usurped too much attention, and has been a prolific cause of educational waste, stultifying instead of nourishing the child. This chapter, in contrast with the others, is destructive rather than constructive in tendency. (7) Children should be obliged to apply the information gained through study, since use or adaptation to environment is the end-point of ideas, of the capacities and abilities of animals and men, of the subject-matter of any branch of study whatsoever, and of all education. This is the goal of ideals as well as ideas, and can be realized not only in manual and constructive execution but also in skillful talking about the subject-matter. (8) Lastly, there should be ample provision for individuality in study. So far as *study* is concerned this chapter is largely superfluous, as it is, or might be, adequately treated under the fourth factor above. The author, however, treats the topic in relation to the wider work of the recitation. Each of these factors is richly illustrated by anecdotes or concrete examples, and, throughout, the attempt is made to show that the child is capable of studying in the manner required and to suggest definite rules to guide the teacher in training him to do so.

Excellent as this book is it is not invulnerable against the darts of adverse criticism. While the points developed are set out *seriatim* and developed with commendable clearness, the book is extremely diffuse and repetitious—faults which our author will probably regard as virtues, in view of his contention that proper study involves neglect, or a rapid skimming of secondary material. Much of this repetition might have been obviated by a better sequence of the chapters.

With respect to the relative emphasis to be placed upon the various factors themselves, there is abundant opportunity for differences of opinion. The fact that it would be advisable to teach the more mature pupils to skip and skim in their reading does not imply that this is proper for the younger pupils. Not only so: I believe such practice would prove pernicious. Not only would it tend to produce superficial readers, but the younger pupils do not possess a sufficiently adequate apperceptive basis to enable them to practice much "neglect" in reading. That tendency is now all too obvious without added encouragement. Every fact for them is largely novel and must be thoroughly

mastered, unless the continuity and content are to be sacrificed. Mature students are able to neglect the old materials in their reading without much loss, and they should be trained to concentrate on the large and novel facts.

Again, in the United States we are in need of a fine balancing of the claims of individuality and diversity as against the claims of conformity and social uniformity. It is possible so to stress the doctrine of the sovereignty of the individual as to erect an anti-social standard in education. Individualism run riot spells social anarchy. To prepare the child for social efficiency demands a considerable measure of subordination of self in the larger interests of social uniformity. To rigidly "accept yourself as you are" (p. 251) would place an effective mortgage on individual progress. Personal growth with most persons results from an attempt to approximate a model, some other personality viewed as a pattern worthy of imitation. The process of annihilating the self from the kindergarten to the college (p. 264) is largely an exaggerated picture, a bugaboo, fighting which many a Don Quixote has wasted many a shot and shell. The assertiveness, independence, disrespect for expert opinion, adult authority and counsel, and priggishness of Young America, do not stand in need of special encouragement. These tendencies are stimulated by the very atmosphere of our democracy. It is the lesson of restraint that needs emphasis. What we require is a better adjustment between the demands of individuality and social conformity and subordination. Society cannot stand the strain of too many geniuses or juvenile prigs. Social integration demands socialization rather than individualization for the vast majority of men.

To train the child to assume a critical attitude toward what he reads and to judge the worth of the statements is, of course, desirable. Yet here, too, there is danger of overreaching one's self, so far as the younger pupils and the exact sciences are concerned. In the first place, the pupil will not possess an adequate apperceptive basis to enable him to sit in judgment on the opinions of mature experts and weigh conclusions in unknown fields; and second, the constituency of our country at large, old and young, treats with scant respect the expert opinions of its specialists. In this respect we present a sad contrast to the older cultural nations of Europe or the Orient. We need to train our young to respect authorities and experts, and this demands again a fine balancing of conflicting claims.

So far as concerns the factor of use, the contrast between the cultural and liberal courses, on the one hand, and the practical, on the other (p. 198f), is largely illusory, so it seems to the writer. The cultural courses may not be immediately convertible into dollars and cents, but they are of great practicability so far as concerns implanting *ideals* to shape and guide future conduct—ideals of persistent endeavor, of conquest in the face of difficulties, of effective method, of superior values, etc.

A tentative attitude toward knowledge will, no doubt, prevent excessive and misguided action. At the same time, we learn, not by mere ratiocination, but by doing, even by misguided action. The first condition of learning is fertility of response. There is a positive danger of excess inhibition, of delayed action. Our minds may become so sicklied o'er with the pale cast of thought or with tentative feelings as to lead to mental paralysis or motor impotency. The advice to seize the first opportunity to act—to cite James—and profit by your mistakes, will probably result in healthier growth than protracted cogitation because you are not absolutely certain of your ground.

The chapter on memory impresses the reviewer as inferior to any of the others. Professor McMurry aligns himself with those who, with James, regard memory as a fixed hereditary function unmodifiable by training. In so doing he fails to utilize the recent experimental material bearing on formal training and particularly on memory transference through specialized training. The memory experiments uniformly indicate that by training the memory in particular directions we can improve it for other facts whose nature is diverse. Many of the other objections to memorizing are also, so far as my experience goes, exaggerated or largely illusory. The reviewer also finds himself in disagreement with the author's conclusions regarding the effectiveness of the drill and the inferiority of the teachers who still resort to its use. I believe that the present tendency is very strong to return to a judicious use of the drill. The reader will immediately recall the recent book by Jones on Teaching Children How to Study. It is especially with respect to this factor that Jones' treatment of study differs so widely from McMurry's. Jones solves the problem of study by dividing the children into groups, so that they may obtain more individual attention and so that they may have more time for judiciously directed seat work, independent study, and drill. Jones sounds a clarification note for the return to the drill. I have in a separate paper argued the case for the drill (this JOURNAL, April, 1910).



After all is said and done, it is a question whether *direct* classroom instruction in the art of study will accomplish as much as the indirect instruction, or training, afforded by skillful teaching. The conversion of economic *methods* of study into economic study *habits* will depend most largely upon the manner in which the recitation processes are handled by the teacher. The child automatically and inevitably adjusts himself to the demands imposed upon him by the teacher. His study habits offer no exception. Skillful testing will result in judicious study.

In any event, this is a book which every enlightened teacher should read with much care. If every teacher in the land were to follow only those suggestions concerning which we can substantially agree—and that includes the majority—much good would result to the pupils of all our schools, elementary or higher. Unless I mistake, the book will have a large sale.

J. E. W. WALLIN.

Cleveland Normal Training School.

M. V. O'SHEA. *Social Development and Education*. (Boston: Houghton Mifflin Co., 1909. \$2.00 net.)

Professor O'Shea attempts in the first part of *Social Development and Education* to describe the reactions of the child to his social environment, to set forth the changes and development in these reactions during childhood and youth, and to explain them in terms of mental development; that is, he has undertaken to determine the evolutions of the child's social instincts and tendencies, to find out what the child is by nature.

The topics discussed in Part I are sociability, communication, duty, justice, respect, docility, resentment, aggression and social types. The method of treatment is to describe the manifestation of these characteristics in children, to determine their appearance and trace their development in the life of the child and to discuss individual variations in them. The descriptions are based on the author's observations, supplemented by occasional quotations from friends and correspondents. Since the treatment of all the topics is about the same, it will perhaps be sufficient if we give a brief review of the chapter on Social Types.

Children differ in the degree to which any tendency is manifested, and the length of period of its continuance. From the second year on, children differ in the general attitude of their response to the social environment. These differences in attitude may persist through life, but on the other hand the child's attitude may change before maturity. First of all, children differ as to their adaptability. Some children readily take on the manners and customs of society, others resist the demands made upon them by their elders. There are, then, the adaptable and the unadaptable, with several varieties and subdivisions of each. On other grounds of classification, we have what the author calls the "open type," to which belong children who are frank and straightforward. Then there is the deceitful type, the self-conscious type, the dramatic and the non-dramatic type. We have also the hectoring type, characteristic of the bully, and the opposite, the meek and submissive type. The author concludes that all these types are variable and plastic. "One cannot tell," he says, "from observing the social tendencies of a young child what traits will be dominant in him in maturity, though if all educative influences can be controlled and directed, it may be possible to make a rough sketch of the disposition when it shall have ceased to be plastic, or nearly so." It is difficult to see how this is possible if the type of the child is likely to change to the opposite, unless there is some way of determining whether this change will take place. No such principle is given us.

In Part II, the author undertakes, to use his own words, the "difficult and interminable task of outlining a plan and method of education designed to make the individual socially efficient." The point of view, we are told, "is that of the naturalist, rather than that of the logician, or even the moralist or idealist." The author has tried to determine what is possible to be done rather than what ought to be done in social training. The first chapters of this part are, in our opinion, quite the best part of the work. They begin with a careful analysis of the causes of decay of ancient and modern nations, together with a statement of the conditions and tendencies of our own country. In a nation's youth her people are energetic, socially efficient and manifest the social virtues. But when a nation reaches maturity and material success is achieved, her people degenerate socially and morally because they do not know how to use their leisure time. This is not inevitable. It ought to be possible so to control social forces that a

nation could endure indefinitely and never grow old. This could be accomplished if the people were developed and trained in their intellectual and æsthetic natures. Education must develop the children in other than material things. A nation of alert minds will discern and should be able to control the forces that threaten degeneration in the national life. To this end *all* must be educated, all must be given higher interests and ideals and each must be trained for social efficiency. In our own country the schools are not developing a love for genuine knowledge, we have hardly begun to do vital teaching or establish ideals that will exert a controlling influence. Formalism must be replaced by vitalism. Our great need is teachers of the highest caliber, teachers of the highest ideals and genuine knowledge. It ought, as a result of education, to be possible that each generation should grow in strength and efficiency.

The author then considers such topics as moral training and the relations of the school and home. In the former, he lays too much stress on developing moral principles and ideals in the minds of children and not enough on the matter of habit and practice. On the latter point, he tells us that "children who are taught to read, write and cipher in their homes have to be literally driven to their tasks." It occurs to us that there are some children that have to be driven to school. If modern psychology says anything on the subject, it is that the home is the best place for the education of the child. Of course, we have in mind a good home as compared with a good school.

Following, there is discussion of the topics: co-operation in group education, need of playgrounds, and problems of training, incidentally also of some growing evils of the present day. One of these evils is the early maturing of children, through taking up in early years, the customs and practices of adults. Parties, dances, fraternities and the like hurry young people into maturity. As a result of smoking, drinking, gambling and other evils, "A considerable proportion of the students in our higher institutions receive comparatively little profit from their course." As to methods of correction, the author cites the opinions and practices of many men, but makes himself no essential contribution to the subject. However, the chapters on suggestion and imitation are valuable, and their lessons ought to be taught to every teacher. One passage (p. 391) is worth quoting at some length:

"The remedy for the present condition of affairs in the village must be found in wholesome occupation in line with the natural interests of boys and girls. There must be furnished opportunities for employment that will be upbuilding,

and at the same time interesting and attractive. Manual training schools would do for the boy in town what the farm did for his father, and more,—they would engage him in an activity which he would like, and in the prosecution of which he would have to co-ordinate his powers in the attainment of definite ends. He would be compelled to save his energies for this purpose, and not squander them in riotous living. Greek and Algebra and parsing will never keep the village boy from drink and things worse; such a curriculum is liable to drive him out of school on to the street. Everything in the schools ought to have an obvious life relation for the boy who has passed his twelfth birthday. He must feel that in mastering any study he is gaining real power, which he will find of service in the world outside."

The author provides a bibliography in which he has, unfortunately, failed to incorporate the initials of the authors cited. Finally, there are more than one hundred pages of exercises and problems. These, if used in directing and testing the observations of students, ought to prove very helpful.

The book indicates wide and careful observation. It is valuable as giving the experience and setting forth the opinions of the author. One cannot help feeling, however, that if another man of just as wide experience and just as good judgment had written the book, both experiences and opinions might have been quite different. This means, of course, that we have no science of social development, and cannot have one until our methods of studying the development of the child are refined. We cannot settle educational questions by quoting opinions, as the author, for example, does, in discussing corporal punishment. What is wanted in such cases as that, are facts and principles, not beliefs and opinions. Opinion and belief have little place in science, but since we have no science of this subject, perhaps we should not be critical of individual observation and opinion. Nevertheless, writers of books on education are too apt to set forth opinions having little support in fact, conclusions without data, broad generalizations based on casual observations. There ought to be some way of determining by strict scientific procedure the facts concerning the social development of children. Every psychologist knows how far wrong unaided observation—even of a careful observer—is likely to be.

W. H. PYLE.

University of Missouri.

C. F. BIRDSEYE. *Individual Training in our Colleges.* (New York: The Macmillan Company. 1909. Pp. xxxi, 434. \$1.75.)

This is a book well worth reading. It is one of the few books of which it can be said that it ought to be read by every youth contemplating college, every college student, alumnus, professor and officer. The value of the work lies chiefly in its interpretation of college life and its clear statement of problems which have been to a great extent overlooked by all concerned in college affairs.

The volume is divided into four parts. Part I., The Ecclesiastical Period of Our Colleges, gives a concrete and delightful description of the student life in the earliest colleges, together with an account of their founding, organization, purpose, and ideals. Part II., The Age of University Building, treats of the rise of universities in America, the German influence upon higher education, the great changes in number and social standing of students going to college, changes in motives, ideals, studies, entrance requirements. The question of Present College Conditions as to College and Interecollegiate Athletics fills one chapter, which discusses the undermining influence athletics are exerting upon the entire moral tone of our colleges and the insidious manner in which the plague has crept into the secondary schools: how they have introduced bribery and lying, how they have opened the way for football coaches who in some cases instruct in methods of felonious assault.

Part III., The Greek Letter Fraternities, in three chapters discusses the origin, importance, and place of the fraternity in college life. Part IV., The Remedy, attempts to solve the more important of the problems previously suggested.

The argument of the book is suggested in its title—the early small colleges produced social-problem solvers. They did this by giving to a small number of men individual training. In our great universities and colleges today the student no longer receives individual training. Professors, alumni, and endowers have forgotten the individual student in their mad rush after athletics, laboratories, and new courses of study. The student spends but a small amount of his time in the class-room—perhaps five per cent. For the remaining ninety-five per cent. he is responsible to no one. The greatest influence during these four tremendously important years is not the class-room, but the

home life of the student. This college home life is lived in dormitory, fraternity house, or boarding house. It is through these channels that the student's personal life must be reached and individual training given. The professors of the present day are specialists. Their energies are taxed to the utmost to keep abreast of the times in their own fields. They are not looking after the personal life of the students; what is more, they cannot be expected to. The alumni must shoulder this burden. How they are to do it Mr. Birdseye attempts to show.

The book as a whole is timely, clear, and well written, yet it is disappointing in certain respects. Throughout his work the author appears to identify individual training with moral and religious training, despite the fact that he is continually demanding practical efficiency as the test of such training. He constantly holds up the work of the athletic coach as almost the only remaining type of individual training. A better example would be the professor conducting a laboratory or seminary course. The author overlooks the fact that the colleges of today in their tendency toward specialization, even in the liberal arts courses, are giving a greater degree of individual training than ever before. His conviction that the early colleges gave individual training may well be called in question. Personal training they provided, but individuality was little encouraged by the narrow course, the same for all, without any consideration of special abilities, tastes, and aspirations.

In his picture of student life at the present time the author seems to have fallen victim to the "fallacy of the conspicuous." The poor and earnest student, identified in his mind with early times, is to be found by the thousands in America today—students who cook their own meals, wait on tables, rise before dawn to study in chill rooms or to deliver newspapers. The lives of such students are quiet and inconspicuous. The spendthrift and the college loafer are comparatively new factors in college life in America, but their moral code, habits, and manners cannot rightly be presented as the standards of the average student. It is true that there are colleges where students may loaf through soft "culture courses" and receive a degree if they secure a passing grade. There are others, and the number is increasing, where a student must receive the grade of "good" (next to the highest rank given) in at least half his work in order to receive his degree.

The writer's point of view is valuable because it is that of one who, though a college graduate, looks at the problems from the outside. Nevertheless, he is unable, just as President Eliot was unable, to get from under the domination of his own college. He cites (page 213) Amherst as "a good typical case" in respect to the way in which Greek Letter Fraternity houses are pushing out dormitories; whereas Amherst, as everyone knows, is an extreme case. As a fraternity man from a fraternity college, he overestimates what the fraternity can do in solving the college social problems in America, especially for that large body of men who will never enter fraternities. He is wrong in assuming, as he constantly does, that college and university faculties are not attempting to learn and solve the problems of student life.

He promised to avoid pedagogical questions, but, like every lay reformer, he sooner or later feels his ability to deal with all matters, and goes so far as to suggest that we return to the eighteenth century custom of giving students at the close of their course an oral examination on all subjects covered during the four years. He also suggests that alumni be called upon to assist the faculty in making out courses of study.

The greatest of all pedagogical problems he does not state, or at least fails to deal with: the unreality of the larger portion of the academic course of study and the wretchedly poor methods of teaching; the fact that much of the teaching in our universities and colleges would not be tolerated in a first-class high school.

In closing, it might be said that the book as a whole is weakened by repetitions, platitudes, and by sweeping statements which will not pass unchallenged by any thoughtful reader. Nevertheless, it will stimulate thought and will no doubt prove a powerful factor in compelling colleges to recognize and deal with problems which they have neglected. It is free from the wearisome philosophizing which has kept the public at large from reading many educational books. It has a message and the author is determined that this message shall strike home, and it does.

F. H. SWIFT.

University of Minnesota.

- L. W. COLE and F. M. LONG. *Visual Discrimination in Raccoons*. Journal of Comparative Neurology and Psychology, 19: 1909, 657-688.
- J. B. WATSON. *Some Experiments Bearing Upon Color Vision in Monkeys*. Journal of Comparative Neurology and Psychology, 19: 1909, 1-28.

These two papers dealing with visual discrimination in animals are interesting evidences of the present rapid advances in the use of scientific method in comparative psychology. In both cases color vision was the particular object of experimentation and both reports are portions of more extended studies.

The method which has heretofore most frequently been used in work on color vision, that of using ordinary daylight reflected from the surfaces of colored papers, was employed by Cole and Long for the study of the raccoon. Thirty-nine of the Milton Bradley colored papers and five of the Hering gray papers of equal brightness with certain groups of the colors, as determined by Rood's flicker method, were used. The papers were very carefully tested as to degree of brightness and were divided into seven groups. The papers of any one group were pasted upon ordinary drinking glasses, which were presented to the animal simultaneously in a wooden frame. The animal was to select a glass of a certain color which contained food. The position of the food glass was changed after each trial. In order to avoid the possibility that the animal might be guided by smell or any other evidence than color, many control experiments were made.

As far as the evidence from the use of this method can be accepted, the authors are undoubtedly justified in their conclusion that the raccoons can be made to discriminate objects by color alone, though they are seldom called upon to do so in their natural state. A large number of tests were required to bring it about.

As to the value of this method Watson is skeptical. In fact, in this preliminary paper on color vision in monkeys he asserts that "the use of colored papers can never give us a satisfactory test of color vision in animals." He mentions these reasons: (1) Colored papers afford numerous secondary criteria; (2) they do not reflect monochromatic bands; (3) "the range of intensity obtainable in them is so limited



that if any given region of the spectrum should offer to the animal a different order of intensity from that which the same region offers to our own eyes, the slight change which we could introduce in the brightness of a given stimulus, by substituting a paper of the same color, only lighter or darker (to our own eyes) might not at all reverse for the animal the intensity relation originally existing between the colors."

Watson has therefore devised an apparatus which makes use of spectral light. It is impossible here even to summarize a description of the apparatus, whose complexity of detail appears at first rather appalling. The principle is that of the spectrometer and the source of light was either a hand-feed arc or sunlight. By systems of lenses, mirrors and prisms the rays of light were passed through a large prism and reflected upon a screen in view of the animal; any two bands in the spectrum could be selected, sharply limited and their positions reversed at will. Three monkeys were tested and of course experiments for controlling secondary criteria were made.

These experiments were chiefly introductory and suggested as many problems as they answered. The tables show in all cases a gradual rise of discrimination until a fairly steady maximum under an unchanging set of conditions had been reached. Then the effect of introducing changes in relative brightness of the two bands and in their form and surfaces is shown. Among the interesting results noted are the following: (1) In the early part of the red-green tests the monkeys failed to react to the red. This the author considers as probably due to a preference for the green, since the habit was later acquired perfectly; (2) in the case of all the animals the blue-yellow discrimination arose more rapidly than the red-green. This might have been partly due to practice, but it again raises the question whether the whole red end of the spectrum may not have a low stimulating effect upon the eyes of animals. (3) A tendency was observed in two animals when they had partly learned to associate the food and a particular color to fall back upon choice by means of position. (4) The author points out that there is support in his tables for the conclusion that "a wave length of a given monochromatic light stimulus is, or might be, under suitable conditions, a factor in the adjustment of the animal to that stimulus." He himself refrains from drawing such conclusions at present.

There is no question but that the apparatus and method originated by Watson form a great advance in the study of color vision. They lead in the direction of that accuracy and exactness of method employed in the physical sciences. The preliminary work so far accomplished with them has suggested a large number of difficult and delicate problems which press for solution.

ADA W. YERKES.

Cambridge, Mass.

L. EDINGER. *The Relations of Comparative Anatomy to Comparative Psychology*. Journal of Comparative Neurology and Psychology, 18: 1908, 437-457.

In his interesting discussion of the relation of comparative anatomy to comparative psychology, Edinger gives some stimulating suggestions for work in both these fields. He insists that they are closely related and should be investigated simultaneously,—the anatomy of the brain and the behavior of the living animal. He describes the brain as consisting of two parts, the palæencephalon and the neëncephalon. The former is the oldest part of the central nervous system, appears in all animals from cyclostomes to man and is constant in type in all of them. The neëncephalon, on the other hand, develops above fishes and from small beginnings increases to form the largest part of the brain in man, the cerebrum.

The palæencephalon is by its structure suited to receive sense impressions from the outside world and to convey them to places whence groups of motor ganglion cells send out nerves to muscles. It includes special regulatory mechanisms among which the cerebellum is the most important. Not only all activities which are commonly designated as reflex, but also all instincts, the author asserts, are localized in the palæencephalon. No part of it can be absent without a corresponding function becoming lost, and all parts develop in size according to the demands which the activities of the animal make upon them. A knowledge of the degree of development is of the highest importance for sense psychology and will always give information as to the possible activities of the animal.

Fishes possess only the palæencephalon and it is therefore important that their activities should be thoroughly studied. They are able to establish simple new relations between sense impressions and movement

combinations, but not to form associations or to construct memory images out of several components. Among the reptiles, however, where the neëncephalon makes its appearance, the author states that "the animals are no longer always dependent on the sense impression of the moment, but that earlier impressions influence them. Further, they associate certain sense impressions which lie within the realm of the olfactory and oral senses, and turn them to account; they learn more readily than the fishes and amphibians; occasionally they foresee; and they exhibit individual differences. There can be no doubt that all of these facts are referable to the appearance of a cortex in the neëncephalon." In the birds the palæencephalon is enlarged and reaches a high state of perfection, but the cortex is also more highly developed than in reptiles. The inference from this structure that the instinctive actions must be of much greater variety and perfection, and also the capacity for forming associations must be much greater than in reptiles seems to be justified in the author's opinion, so far as trustworthy studies of behavior have gone. Further observation of birds and reptiles must determine "what activities of the lower vertebrates are palæencephalic and what are neëncephalic" and whether neëncephalic reflexes and instincts exist.

The author refers only briefly to the tasks of the anatomist in connection with mammalian psychology. In spite of extensive studies recently of the mammalian cortex he asserts that we know "surprisingly little as soon as one enquires how much our knowledge tells us about the functions." He urges that anatomical study and psychological observation be united first in the simpler field among those animals which possess only a very simple neëncephalon.

The objection might be made that what the author has described as the field of comparative psychology is really rather that of physiology. He does, it is true, rather sharply separate the simple activities and the instincts of animals from other psychic phenomena, but he states that this is a question of method chiefly. By associating them with the palæencephalon alone, he establishes a foundation upon which to build the comparison between degree of development of various parts of the entire brain and the possession of psychic qualities.

ADA W. YERKES.

Cambridge, Mass.

D. SNEDDEN. *Educational Tendencies in America*. Educational Review, 39: No. 1, January, 1910. Pp. 13-31.

Dr. Snedden notes the following tendencies as significant of the present trend of American education:

(1) The need for vocational instruction is being felt more keenly than ever before, and this feeling finds expression in the present rapid development of vocational courses; this increasing emphasis is gradually leading to a more effective recognition of "concrete realities, rather than abstractions" as the basis of educational endeavor; at the same time it is significant that vocational education is not being, and does not promise to be, divorced from the training that makes for culture and for social and civic efficiency.

(2) There is an endeavor "to find a definition of integral education, and to take steps to realize it." Dr. Snedden means by an integral education, one which takes cognizance of the various educational forces that operate in the training of the child; and the problem of those who are attempting to define such an education is to fix definitely the responsibility that each of these forces—the home, the school, the church, and the workshop—must assume.

(3) There is a noteworthy tendency to evolve a system of educational method. This tendency is revealed most clearly and has produced the best results in the work of the lower grades. In the work of the upper grades and the high school, which is still far from satisfactory, there is "a hopeful attitude of study, of experimentation, of modification, and of progress."

W. C. B.

CYRIL BURT. *Experimental Tests of General Intelligence*. British Journal of Psychology, 3: December, 1909, 94-177.

"Parental intelligence, therefore, may be inherited, individual intelligence measured, and general intelligence analyzed; and they may be analyzed, measured, and inherited to a degree which few psychologists have hitherto legitimately ventured to maintain." This is the concluding paragraph of Mr. Burt's 80-page article.

The author hoped by this study to throw some light on three main inquiries: (1) Can the presence of general intelligence be detected and its amount measured? (2) "Can its nature be isolated and the mean-

ing analyzed?" (3) Is its development predominantly determined by environmental influence and individual acquisition, or is it rather dependent upon the inheritance of a racial character or family trait?

*The Tests.*

*Nature of Process Tested.*

I. Sensory Tests.

- |  |   |                            |
|--|---|----------------------------|
| (1) discrimination of two points upon the skin | } | Perceptual discrimination. |
| (2) discrimination of lifted weights           |   |                            |
| (3) discrimination of pitch (Spearman dichord) |   |                            |
| (4) comparison of length of lines by eye       |   |                            |

II. Motor Tests.

- |  |   |                   |
|--|---|-------------------|
| (5) tapping (puncturing paper at maximum speed with mounted needle). | } | Simple reactions. |
| (6) card-dealing (after Jastrow).                                    |   |                   |

III. Sensory Motor Tests.

- |   |   |   |
|---|---|---|
| (7) card-sorting (cards from different packs sorted according to color on backs)                    | } | Reaction complicated by discrimination. |
| (8) alphabet-finding (from two complete alphabets laid out haphazard subject arranges one in order) |   |   |

IV. Association Tests.

- |   |   |  |
|---|---|--|
| (9) immediate retention of  | } | Immediate memory.  |
| (a) concrete words  |   |  |
| (b) abstract words  |   |  |
| (c) nonsense syllables  |   |  |
| (10) mirror test (subject traces geometrical figure, watching his hand in the mirror)                             | } | Formation of association during motor activity. "Trial and Error."                             |
| (11) spot-pattern test (arrangement of from 7 to 9 spots exposed for 1-25 second, to reproduce position of spots) |   | Formation of associations during perceptual activity. (Progressive process of "Apperception.") |

V. Test of Voluntary Attention.

- |  |   |  |
|--|---|--|
| (12) dotting irregular dots (as they appear in aperture 5x10 cm. in lid of desk) | } | Maximal effort of sustained attention. |
|  |   |  |

The author considers the Alphabet, Mirror, Spot and Dotting tests new in this connection.

A group of boys, ranging in age from 12 years 6 months to 13 years 6 months, were selected from two Oxford schools—"a superior elementary school and a high-class preparatory school"—to serve as observers. The thirty boys from the elementary school were from "the lower middle class, sons of local tradesmen." The thirteen from the preparatory school "were in nearly every case sons of men of eminence in the intellectual world." The tests were also given to a "congenital imbecile."

Simple sorts of apparatus were used that the element of distraction be reduced to the minimum. Observers were tested individually, and in the case of some tests several sittings were required.

The intelligence of the observers was estimated provisionally by the headmaster of each school, who based his judgment upon personal acquaintance and estimates from boys not in the tests, as well as upon class grades.

The method used in calculating correlations was similar to the "foot-rule" or R method of Spearman.

It is impossible for the reviewer to do justice to the large amount of data presented in four full-page tables. Suffice it to give briefly the most general results and conclusions. The results indicate that the six simple sensory and motor tests are of but little use in the empirical diagnosis of intelligence. On the other hand, if we arrange the boys according to the results of the other tests, "we obtain a list correlating with the headmaster's order to the extent of .85 at the elementary schools and .91 at the preparatory school.

"By means, then, of some half-dozen tests, we are able independently to arrange a group of boys in an order of intelligence, which shall be decidedly more accurate than the order given by scholastic examinations, and probably more accurate than the order given by the master, based on personal intercourse during the two or three years and formulated with unusual labor, conscientiousness and care."

In reference to the analysis of intelligence, the author concludes: "High intelligence seems to mean high capacity for continually systematizing mental behavior by forming new psycho-physical co-ordinations, older co-ordinations being retained, so that newer co-ordinations bring with them increasing complexity and incessant change. In such progressively integrative actions of the mind the effective and directive agent is attentive consciousness."

Regarding the third inquiry, which relates to the inheritance of intelligence, it must be noted that the average performance of the boys of the preparatory school was, excepting in weight and tactual space discrimination, superior to that of the boys of the elementary school. Mr. Burt claims that this was not due to superior training or environment, but to the superior parentage of the boys in the preparatory school.

The study is a very valuable one, but we need many more equally thorough along the same line.

WALTER R. MILES.

University of Iowa.

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The Prussian minister of education has addressed a circular to the universities recommending the organization of courses of instruction in open air games. Emphasis is laid on German national games, and the purpose of the movement is to train instructors for primary and secondary schools.

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We learn from the *Zeitschrift für Experimentelle Pädagogik* that the German Teachers' Association has recently established a "pedagogical center" in Berlin, one of the functions of which will be the publication of a *Jahrbuch*. One section of this, entitled "Child Psychology and Pedagogy," will be edited by Dr. M. Brahn, Director of the Leipzig Institute for Child Psychology. Another section, "Problems of Elementary Education," will be divided into a number of sub-sections under the editorship of distinguished educators.

## NOTES AND NEWS.

We take pleasure in calling the attention of our readers to "*School Hygiene*," an English monthly devoted to the interests of health in the schools, the first number of which appeared in January, 1910. The first five numbers contain interesting articles on medical inspection, school clinics, mental fatigue, tests of intelligence, etc. The publication office is located at 2 Charlotte St., London, W., and the subscription price for the annual volume of about 700 pages is 7s. 6d.

During the week of May 12-19 a Mouth Hygiene Exhibition was held in New York City under the auspices of the New York Dental Hygiene Council. One of the conferences was devoted to the consideration of dental hygiene in education, and arguments were advanced for the establishment of school dental clinics.

The children's court at Charlottenburg, Berlin, has just finished its first year. In this time 232 children have been brought before it, and 196 cases have come to trial. In general the efforts of the court have received the support of parents and guardians, but in some cases parents have resented and protested against the probationary measures adopted.

A professor in Berne University, according to the *Albany Citizen*, has traced the history of a family which may well be compared with the history of the Jukes family. In the end of the eighteenth century, a woman died, who for forty years had been "a thief, a drunkard, a tramp." The investigator has found 834 descendants from this woman, and 707 he has succeeded in tracing from youth to old age. Of these, 106 were born out of wedlock, 142 were beggars, and 64 more lived on charity. Among the women, 181 lived loose lives, and in the family have been 76 convicts and 7 murderers. He estimates that in 75 years, this family has cost the German authorities in almshouses, law courts, prisons, and other institutions, about \$1,250,000. What the cost was in spiritual loss and loss in social efficiency is not stated, and it is doubtful if it can be measured.



We have already noted in these columns the meeting at Paris, December 27, 1909, of the Committee of the International Congress of Paidology. On the same date and at the same city there was held a meeting of the International Committee of Educational Psychology. These two organizations profess aims which are closely similar—the organization of national and of international congresses, the co-ordination and centralization of work, etc.—save that the latter committee has emphasized the aim of applying in educational practice the positive results of research in educational psychology.

Without going into details (for which the reader may consult the January issue of the *Archives de psychologie*), it seems evident, at least so far as one can judge at this distance, that the advancement of educational research would be best served by a fusion of these two independent, and at present somewhat conflicting lines of activity.

The second of the committees named above was organized provisionally by Binet in 1905, but had been inactive until the meeting was held in December, 1909. It is represented in France by Binet and Bédorez, in Germany by Ufer and Meumann, in England by Rivers, in Belgium by van Biervliet, in Holland by Heymans, in Italy by de Sanctis, in Russia by Sikorski, in Switzerland by Claparède; the vacancy caused by the resignation of Professor Baldwin, who at first represented America, has been filled by the selection of Professor Whipple, of Cornell University.

Among the plans recently announced by the authorities of Johns Hopkins University for the extension of the work of the institution is the establishment of a training school for teachers.

During the week of May 1-7 the Brooklyn Training School for Teachers celebrated the twenty-fifth anniversary of its foundation. In this period the school has had a phenomenal growth from a mere handful of students to an enrollment of nearly 1200. The celebration included a memorial service for those teachers who have died in active service, a field day, an exhibition of the work of the school, a parents' evening, an allegorical program representing social progress in the past twenty-five years, and ended with an alumni reunion.

Dr. Stevenson Smith, professor of psychology in Hampden-Sidney College, will conduct a psychological clinic for backward children this summer at Teachers College, Columbia University.

The National Association for the Study and Education of Exceptional Children held its annual meeting in New York City, April 21 and 22. Among the papers presented were, "What is being done in the Public Schools of New York City in the Training of Exceptional Children?" by Associate City Superintendent Andrew W. Edson; "The Exceptionally Bright Child," by Maximilian P. E. Groszmann, and "The Training of Teachers for Backward and Exceptional Children," by Will S. Monroe.

At Harvard University Professor E. B. Holt announces a course of lectures for next winter on the history of psychological problems.

Professor James R. Angell, of the University of Chicago, has gone to Europe, to remain until September. Professor Walter F. Dearborn, of the same institution, is also in Europe.

Dr. Henry H. Goddard, Director of the Department of Psychological Research, New Jersey Training School for Feeble-Minded Boys and Girls, sails for Europe on the 9th of July. Dr. Goddard expects to attend the International Congress of School Hygiene at Paris and the Brussels Conference on Home Education, at each of which he will present a paper. Dr. J. E. Wallace Wallin, of the Cleveland Normal Training School, will take charge of Dr. Goddard's work in psychology at the Summer Session of the New Jersey Training School.

So great has been the interest manifested in the Summer School Course of the New Jersey Training School for Feeble-Minded Boys and Girls, and so many more people have applied for admission than could be accommodated, that Superintendent Johnstone has decided to open a winter course in February, March and April.

Dr. Bird T. Baldwin, professor of psychology and education at West Chester State Normal School and Swarthmore College, recently lecturer in the School of Education, Chicago University, has been appointed professor of school administration in the University of Pittsburg.

W. S. Ellis, principal of King's Collegiate Institute, has been appointed dean of the faculty of education in Queen's College, Kingston, Ontario. Sinclair Laird, of Dundee, Scotland, has been made associate professor of education at the same institution.

At Yale University, Dr. E. H. Cameron has been advanced from an instructorship to an assistant professorship in psychology.

Mr. H. F. Adams, Fellow in the University of Chicago, has been appointed instructor in psychology in the University of Kansas.

Dr. R. M. Ogden, of the University of Tennessee, has been advanced to a professorship of philosophy and psychology.

Professor George P. Bristol, of the department of Greek, and director of the summer session, Cornell University, has been appointed head of the School of Education in that institution.

Dr. W. Van Dyke Bingham, instructor in educational psychology, Teachers College, Columbia University, has been appointed assistant professor of psychology in Dartmouth College.

PUBLICATIONS RECEIVED TO MAY 1, 1910.

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F. ARNOLD. *School and Class Management*. New York: The Macmillan Company, 1909. Pp. xxiv, 403. \$1.25 net.

WILHELM BOUSSET. *What is Religion?* New York: G. P. Putnam's Sons. \$1.50.

ELMER ELLSWORTH BROWN. *Government by Influence, and other Addresses*. New York: Longmans, Green & Co., 1910. Pp. 245. \$1.25 net.

C. B. DAVENPORT. *Eugenics: The Science of Human Improvement by Better Breeding*. New York: Henry Holt & Co., 1910. Pp. 35. 50c.

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ELLEN KEY. *The Education of the Child*. New York: G. P. Putnam's Sons, 1910. Pp. iv, 85. 75c.

R. TAIT MCKENZIE, B.A., M.D. *Exercises in Education and Medicine*. Philadelphia and London: W. B. Saunders Company, 1909. Pp. 406. \$3.50 net.

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*Report of the Commissioner of Education for 1909, Volume II*. Washington: Government Printing Office, 1910. Pp. 599-1373.

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## EXPERIMENTS IN LEARNING.

W. F. DEARBORN

*University of Chicago*

The experiments described in this article form a part of a course in experimental education which has now been in operation for several years in connection with the classes in educational psychology at the University of Wisconsin. The writer has attempted to develop a course of experiments for students of education of the sort so well prepared for the general student of psychology in the manuals of Judd and Seashore. Some of the experiments in learning are presented here in the hope that they may be suggestive of the kind of experiments which may be developed where there is little or no opportunity for laboratory work. Even with a fairly well equipped psychological laboratory at one's disposal, it is not always feasible to conduct a course of laboratory exercises of the usual sort. The time allotted to the subject in the curriculum may not be sufficient to allow for the acquirement of the technique required in handling more or less elaborate apparatus, and even where there is time, it is often questionable whether in the introductory course the results are commensurate with the efforts demanded. On the other hand, few teachers will deny the advantages of some sort of experimenting on the part of the elementary student, and where there are no laboratory facilities experiments of the general kind here described will, it is the writer's opinion, justify themselves. Where laboratory facilities are at hand the equipment is seldom sufficient to admit of individual experimentation on the part of the large classes usually found in the introductory courses. If apparatus is employed,

it must be of simple design and arrangement, so that it may be easily duplicated, and also that the student may work without much direct supervision.

The above statement is not presented as an apology for the simplicity of the experiments outlined below, but as an indication of the conditions which are usually met with by those who desire to give some opportunity for experimental work in the introductory course, and which make desirable some such experiments as are here described.

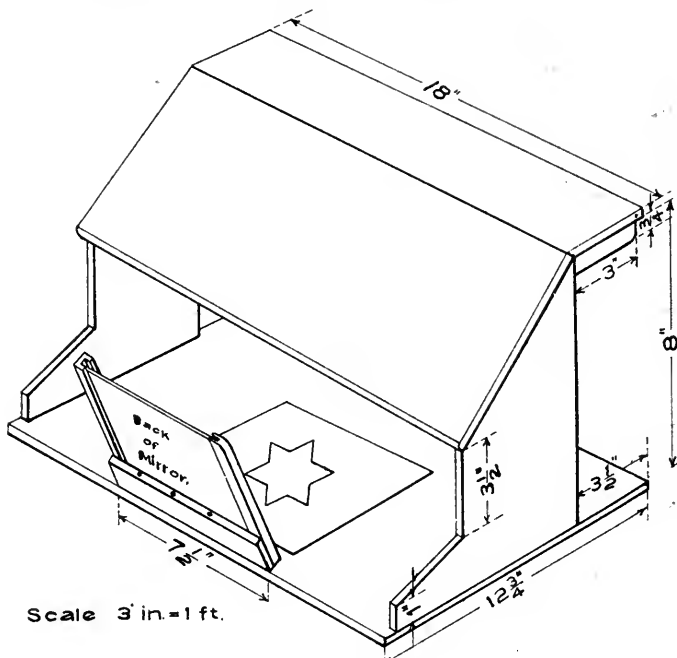


Figure 1.

### 1. *The Trial and Error Method of Learning.*<sup>1</sup>

In connection with the close discussion of the various meth-

<sup>1</sup>This experiment was first made use of by the writer in 1905, and had, as far as the writer was aware, not been described. It has since been employed by *Judd*, *Manual of Laboratory experiments*, and *Burt*, *British Journal of Psychology*, December, 1909, and possibly elsewhere.

For an interesting practice experiment with this apparatus see an article by *Starch* in the *Psychological Bulletin*, 1910.

ods of learning, such as the so-called "trial and error," imitation and reasoning, some experimental work is of distinct advantage. Actual demonstration of the results, if not of the processes of animal learning, such as might be done with the white rats and maze, might be more convincing than the direct experiment of the student, but this is seldom possible.

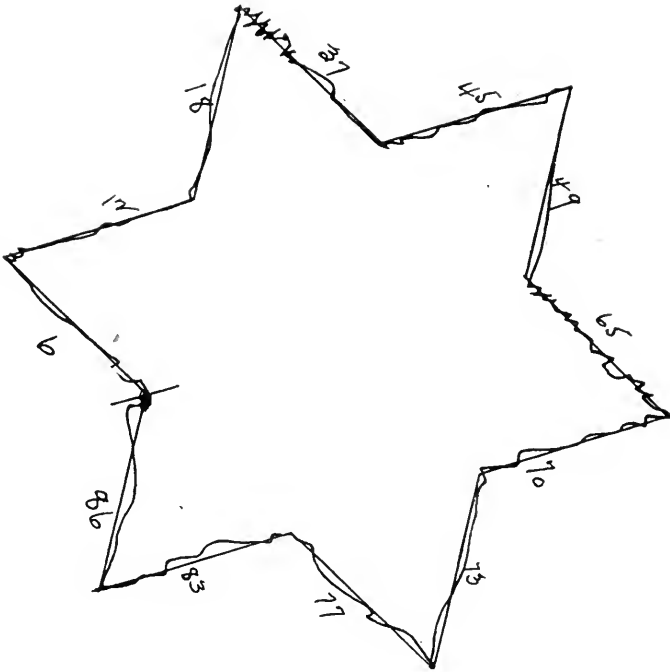


Figure 2.

There is, on the other hand, some advantage in an experiment which will indicate that the trial and error method is in certain conditions regularly employed, even in adult human learning. The student is apt to get the impression from the usual discussion that trial and error, as a method of learning, is confined in its use to animals and children.

In the experiment suggested the subject is directed to trace out the figure of a star by means of its image as seen in a mirror. The figure itself and the hand and arm employed are concealed from direct view by means of a simple screen as shown in Fig. 1, and all visual guidance is secured solely from the reflection in the upright mirror. In such a test

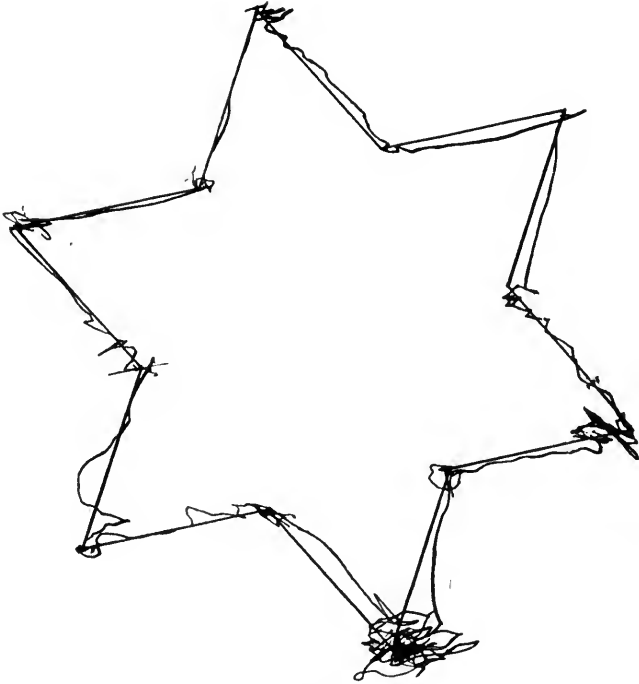


Figure 3.

as this, there is disturbance of the usual relation of visual and motor factors, which has to be adjusted. To one familiar with the principles of the mirror,—and theoretically we all are—the problem is one which might very well be reasoned out. It should, perhaps, present no greater difficulties than some of the tests for reasoning applied to animals, and is at any rate as much within our field of experience as some



of the latter tests are within the animal's range. The natural reaction is, however, not to reason much about it, but to make actual trial of it from the start. Typical results of such a trial are indicated in Figs. 2 and 3. The subject is directed to keep to the line, and, if he gets off, to return to it as quickly as possible. The star is printed at such an angle that no lines are exactly parallel or perpendicular to the base line of the mirror. The chief difficulty is experienced on the slanting lines. After several trials most subjects learn to trace the figure with but few errors. As an indication that this improvement on the basis of a trial and error procedure has not necessarily resulted in any more general acquaintance with the real difficulty involved, Fig. 4 may be substituted for the star and the subject asked to place his pencil point at the dot in the center of the figure, and draw without hesitation and with but a single rapid movement toward the numeral designated by the operator.

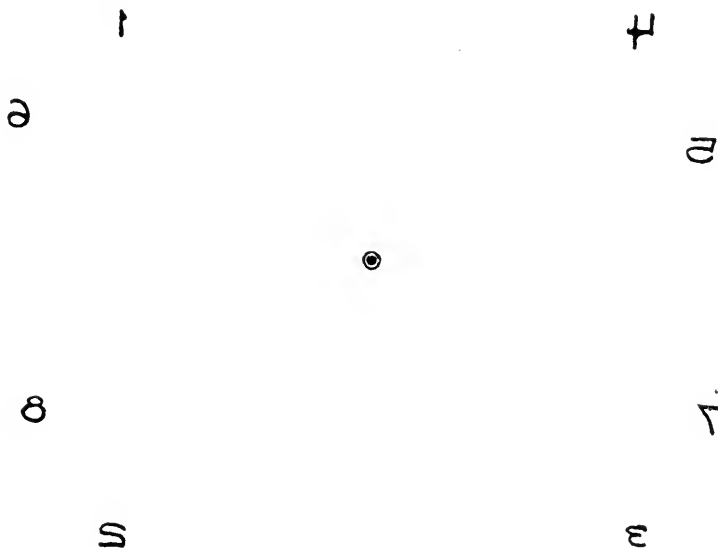


Figure 4.

As a further modification, the first trial of the test may be made with the left hand. Let one-half of a star be traced with the left hand and then after practicing with the right hand until considerable improvement in time and accuracy has been noted the remaining half of the first star may be traced by the left hand, and the improvement over the first trial noted. This furnishes a test of the "transference from right to left hand." Some indication of how much of this is due to the mere repetition of the second trial and how much to other factors may be secured by having one-half of the class make only the left hand tests without the practice with the right, and using this result as a check upon the data of the other half of the class.

## II. *The Practice Experiment.*

The chief difficulty in adapting experiments in learning to an experimental course is that it takes time to learn anything worth while and still furnish opportunity to follow carefully the rate of progress and to analyze the various factors which enter into the process. If, for example, we were to repeat the typical practice experiment in the rate of learning, that of learning to typewrite, to write shorthand, or to make a definite improvement in some sort of memory work, a lengthy practice extending over weeks and months must be made. This, of course, is quite out of the question in the ordinary laboratory course..

The following experiment has the advantage of paralleling the methods of learning employed in the studies of Bryan and Harter, Swift, Book and others, and of giving results which are similar. When the results are plotted in the usual way they may be compared by the student directly with those of these more elaborate studies. Such features as the daily variation of practice gains, the initial rise and the plateaus in the learning curve will be well illustrated by at least some of the records obtained by the class. Individual differences, of course, appear here as elsewhere, when

accompanied by the introspections which are required. Explanations may be found for some of these individual factors.

For conducting the test half a dozen or more blanks like that reproduced in part in Fig. 5<sup>2</sup> and containing on the left hand margin several pages of connected prose is given to the student with a set of carefully prepared directions. The test, as may be readily seen by reference to Fig. 5, consists in spelling out the words on the left hand margin by substituting for each letter the numbers found associated with the particular letters in the circles of the keyboard at the top of the blank. The numbers are placed in the little square to the right of each line, one number being substituted for each letter that appears on the corresponding line. The students are directed to practice a definite time,—five or ten minutes each day, at a given hour, in making these substitutions. The purpose of the test being to make as many substitutions as possible in the allotted time *without error*, it being distinctly desirable to have but one measure of progress, namely, the time taken uncomplicated by an error curve. The results of the practice are plotted daily, as the knowledge of the results serves as some incentive to effort. As a further incentive to maximum effort, there is a certain amount of rivalry which usually develops in the class as the experiment progresses. The initial and at least one test towards the end of the practice may advantageously be made in class; the rest of the practice may be done out of class hours. On each day before making the test the subject is asked to record whether or not he expects to make improvement over the previous record. This furnishes some indication of the mental attitude in which the experiment is approached. In addition, he is asked to record his physical and mental condition, or any other factors which may influence the performance of the test. If, for example, there appears a period of little or no progress lasting for several days, he has an

<sup>2</sup>This blank is a modification of one which the writer found in use in the Psychological Laboratory of the University of Wisconsin.



opportunity of testing the validity of Swift's suggestion that the *ennui* resulting from the monotony of practice is a causative factor. He is also asked to record the time at which he finds he has through actual use learned the equivalents of all the letters,—it being definitely understood that the substitutions are not to be memorized independently, but only learned by employing them.

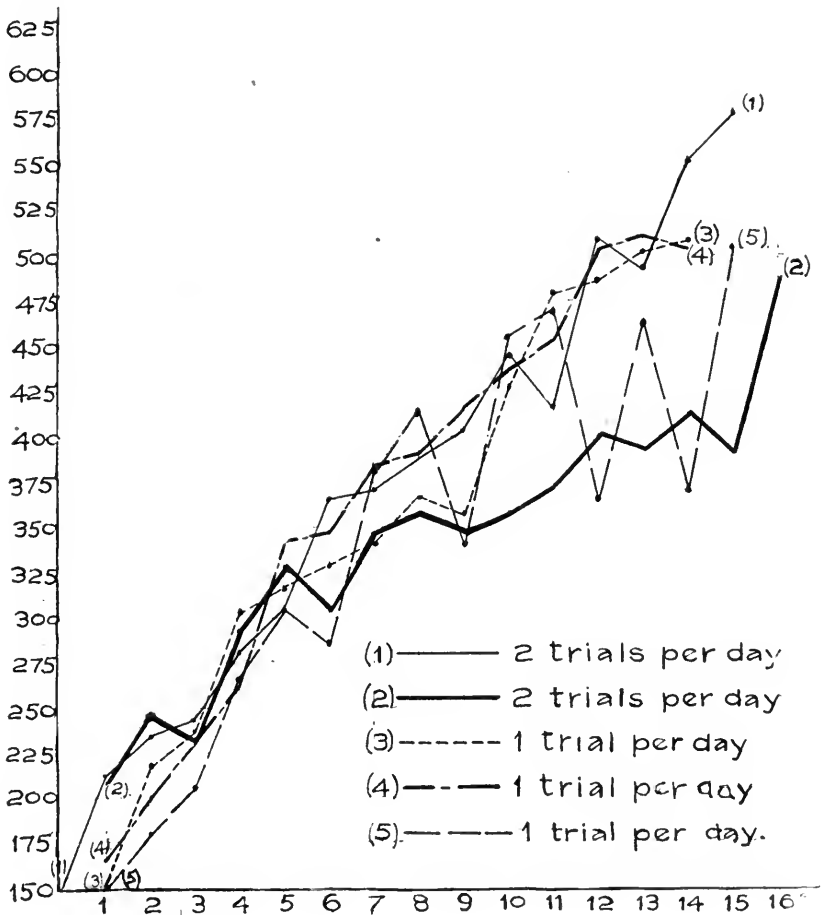
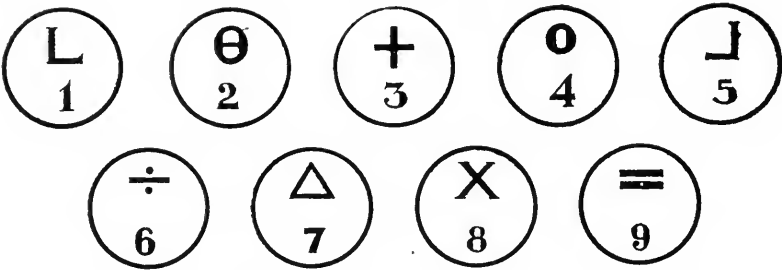


Figure 6.



84,976					27,516				
79,821					33,821				
63,442					97,473				
21,629					62,978				
57,183					31,542				
32,761					17,143				
95,146					26,981				
28,349					35,724				
73,862					16,315				
91,563					14,923				
37,628					34,762				
42,916					28,543				
23,729					83,936				
85,652					75,314				
35,486					56,283				
29,635					19,175				
72,518					36,293				
24,631					85,746				
19,852					15,283				
76,431					24,976				

Figure 7.

In Fig. 6 there are reproduced several curves as plotted by individual students.

Before beginning practice an illustrative experiment of the general effects of special practice may be introduced by testing in somewhat closely or more distinctly related activities, as the rate of tapping, of crossing out A's from a printed page, or of such a test as is shown in Fig. 7. The latter test

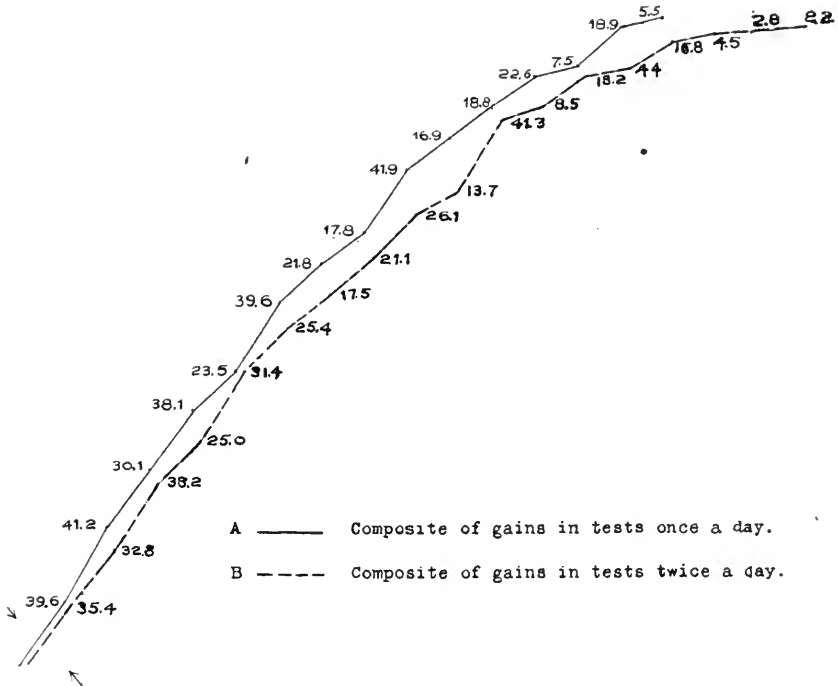


Figure 8.

is of interest, as it frequently gives evidence of some interference with the ability to do it when repeated after the practice on Fig. 5. The interference is developed as a result of the latter practice, and may be used to illustrate the so-called "negative practice" of Judd. If there is a gain, it is seldom equal to that which the subjects expect will result.

For a complete experiment check tests may be made, for example, on another class to determine the average gain that

may result from a second trial after an interval corresponding to that in which the practice was carried on in the first class, but in the case of the second class giving *no* practice.

If the class is large enough, variations may be introduced into the experiment. The class may be divided into two parts, one division doing the practice at frequent intervals of from four to six hours a day, the other division performing it but once a day. The influence of the interval of time upon the rate of progress in learning may then be demonstrated if the intervals are made sufficiently different.

Such a comparison is shown in Fig. 8, one section (A), in this case, practicing at intervals of 24 hours, and the other (B) at intervals of 12 hours. Section A completed the tests in 15 days of daily practice; section (B) in 18 days of practice with two trials a day at about 12 hours apart. The graph shows the average daily gain of the two sections. In this case the daily intervals are productive of a higher rate of progress.

### III. *Practice Experiment in Memory.*

Instead of making use of the traditional nonsense syllables or other meaningless material, results more significant in their educational application may be secured by the use of lists of vocabulary containing words whose meanings are not known to the subjects. Lists of carefully prepared phrases or sentences, because of their content and meaning, furnish still better material, and give opportunity for greater improvement than lists of isolated words. For students of foreign languages the test imposes no particular hardship; in fact, it generally gives the pupil a new conception of the possibilities of memory efficiency. Memory for all sorts of material is capable of marked improvement in the case of practically all except those who are already considerably practiced. It is a good deal more economical to commit to memory after a relatively high level of practice efficiency has been reached than to do the work at the low level which the unpracticed memory represents. It is usually a surprise to the



pupil to discover how much improvement is possible when he sets himself to the task as a definite experiment.

In the case of the first six subjects listed in Table I the English meanings of from 30 to 50 unfamiliar words of either German or French vocabulary were committed to memory daily. The object was to note the minimum time necessary to learn to recall the English equivalent at the sight of the German or French word. No attempt was made in this part

## I

### Improvement by Practice in the Ability to Memorize German and French Vocabularies and English Poetry and Prose.

1-6—Practice in Learning French or German Vocabulary. 7-12—In Learning Poetry.

Subject	Subject matter	No. Words or Lines Daily	No. Days of Practice	First Record Lowest Record Gain in Min.	% of Gain	Total No. Words or Lines Learned	Total Time in Hrs. and Min.	Transferred Effect of Practice		
								Subject-matter tested	Time before Practice	% Gain
1	French Voc....	50	21	M. M. 30—13=17	57%	1050	H. M. 6—22	French Verse...	20—15	25%
2	German " ....	35	20	30—12=18	60%	700	6—2	German " ....	20—18	10%
3	French " ....	35	18	30—14=16	53%	630	5—54	English " ....	19—16	17%
4	" " ....	30	22	33—15=18	55%	660	8—6	" " ....	30—28	7%
5	" " ....	30	20	40—15=25	62%	600	7—37	French " ....	30—20	33%
6	German " ....	30	20	30—13=17	57%	600		German " ....	20—15	25%
<hr/>										
		Lines				Lines				
7	Victor Hugo...	32	15	38—7=31	82%	480	3—22	Browning.....	25—12	52%
8	Horace's Odes	18	16	30—8=22	73%	288	3—41	Norse Poem.....	12—10	17%
9	Paradise Lost.		20	38—12=26	68%			Chem. Formula	21—22	0%
10	Browning.....	17	13	30—12=18	60%	221				
11	Enoch Arden.		20	40—18=22	55%			Burke.....	20—16	2%
12	Tennyson.....		26	20—7=13	65%					

of the experiment to guarantee the permanence of the memory work. The experiment usually lasted about twenty days. The time of the first and the lowest record, the gain in minutes and in percentages, the total number of words learned

and the total time expended are indicated in the various columns of the table. Subject 1, for example, learned fifty French words daily for twenty-one days, beginning with thirty minutes at the start and reducing the time necessary by practice to thirteen minutes, making a gain of seventeen minutes, or 57%, on the basis of the initial time. As a result of the practice over one thousand new words were learned, at least for the time being, in less than six and one-half hours. The ordinary vocabulary with the exception of paronyms and declensions, usually learned in a semester's work in university classes is, I am told, less than half of this. The question of the permanence of such learning is one which naturally at once arises. This point may be tested by relearning after a lapse of a few weeks or more the lists which were learned early in the practice and those learned late and most easily, and comparing the results as regards permanence. This point is too complex to admit of full discussion in this paper; it may be sufficient to add that careful experiments have indicated that while it takes relatively somewhat more time to relearn those which were learned with the least time, the absolute time does not differ much. As a result of the relearning, both sets of words are again in mind at a less expenditure in the total of time for those which are well learned when the practice efficiency is at its highest.

It is not intended in this article to discuss the pedagogical significance of such an experiment as this, except as it serves as an illustration of the value of the practice experiment itself. It is interesting, however, to note that at the present time we are seeing in the classics, at least, the publication and use of lists of vocabulary of the various authors read in an effort to replace the wasteful practice of thumbing dictionaries. As stated above, lists of short sentences containing the necessary vocabulary would make easier memory material; but the lists, as they stand, furnish excellent opportunity for testing the merits of learning them as definite practice experiments where the powerful, if elementary, incen-

tives which come from concentrated effort at improvement may be brought into service. Such use of the practice experiment in language work has the further advantage: that, as students in their reading and translation come across the words which have been memorized, this use of translation of them serves much the same purpose as relearning would do. It has been demonstrated in the experiments referred to above that this is a most economical method of learning. Words which, as the result of practice, are learned in a minimum of time may be relearned in about the same time as those which, because they were learned at a low level of practice efficiency, took a relatively long time for memorization. After relearning, both lists of words are at least for the time being equally well before the mind, and a second and third relearning after long intervals of time,—when that is necessary—still leaves a very considerable margin of saving in time and effort in favor of those words which have been learned at a relatively high level of practice efficiency.

#### IV. *Transference of Practice.*

Further tests on the general influence of special practice of the sort indicated in the preceding experiments may also be made in memory and by repeating the usual experiment as first employed by James. Before beginning the practice with vocabularies or other matter—which is usually spoken of as the *practice series*—the student may commit to memory a limited amount of other sorts of material and by learning a similar set after the end of the vocabulary practice—this is the *test series*—may note the effect of the practice on the latter. These results should be checked by having another class or a part of the same class learn the test material at the same intervals of time, but without doing the practice series. It may thus be at least roughly determined how much of the improvement is due to the test series itself and how much to the practice. The failure to do this gives a basis for very serious criticism of the recent work of Ebert and Meumann on this subject.

The results of such an experiment in the transference of practice are shown on the right of Table I. The results of the "check" experiment are not given.

These experiments give the student a much better conception of what is meant by practice and the general influence of special practice than a considerable amount of description of the experiments of others, and will usually be found by students and instructor to be worth the extra expenditure of time which is necessary for their satisfactory completion.

## EXPERIMENTAL PEDAGOGY IN FRANCE.<sup>1</sup>

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Scientific pedagogy, or paidology, as it is also called, has succeeded to the old pedagogy, to the pedagogy of tradition. Experimentation, which has pushed its way into all the sciences one after another, was bound to make its appearance in the science of education. It is natural that the progress made by the borderland sciences as the result of experiment should have roused pedagogy to new activity, opening to it a new pathway. Pure theory, abstract conceptions, had to give place to precise measurements; the results obtained by psychology and physiology have penetrated pedagogy, infusing into it new life and rendering it scientific and rational. Scientific pedagogy is now firmly established.

To the Americans unquestionably belongs the credit for the new trend given to pedagogy. They call it "child-study," and even today they take the front rank in this science. But Germany, which holds second place, follows them closely. In France, pedagogy, which is regarded with ever-increasing favor, has progressed very rapidly in the past few years, not only in point of laboratory researches, but also in respect to practical applications. I shall endeavor to show in detail the attempts which have so far been made in France to develop experimental pedagogy—attempts which might have been much more numerous if less prejudice or indifference and more boldness and initiative had been manifested.

Up to 1898 researches were carried on only in the laboratory of the Sorbonne, and even these were not devoted exclu-

<sup>1</sup> Translated from the author's manuscript.—J. C. B.

sively to pedagogy. In that year, however, the council of the University of Lille decided to establish a laboratory, which was placed under the direction of M. Lefèvre, professor in that university, and which, according to the ideas of the latter, should be "not merely a school where students come to be instructed in truth already discovered, but a workshop in which we shall busy ourselves with formulating and solving a vast number of problems connected with the psychology of childhood and its immediate applications to pedagogy" (11).

In 1905 M. Alfred Binet, director of the laboratory of the Hautes Etudes at the Sorbonne, established in a primary school at 36 rue Grange aux Belles, Paris, a laboratory of experimental pedagogy in order to "infuse into school instruction the results of the most recent pedagogical researches,"—results which up to that time had been known only to specialists (9). The following is a brief resumé of some of the investigations undertaken:

Intelligence has been measured by means of a series of tests constituting what M. Binet and his collaborator, Dr. Simon, have called a "*metric scale of intelligence*." The first and best of all the tests employed consists of showing a picture to a child and having him name the objects represented in it. We thus discover what has impressed him most, what has been his controlling idea, what is the degree of his mentality, how he perceives, interprets and reasons. Moreover, this test has the enormous advantage of amusing the children and of readily calling forth responses from them. The replies naturally vary according to the age of those experimented on. The older they are the more objects they name, the more accurately they describe the persons and comment upon the things they see. The following will serve as examples of other tests. At the age of four years the children are asked to name and define certain objects placed before them, to compare weights, to copy a square, to point to the right or left ear. At a more advanced age they are

asked to read, to tell their age, to give the number of their fingers, to draw a rhomboid, to pick out a coin, to name the days of the week and the months of the year. At 11 years of age they are required to criticise sentences which contain nonsensical statements, to repeat the greatest possible number of words in a given time, and to define certain abstract terms.

The principle that governs this scale of intelligence is evident from the preceding: It is to arrange a certain number of tests of increasing difficulty, tests which shall be as rapid and accurate as possible, try them on a large number of children of different ages, note the results obtained, and select those tests which succeed for a given age and in which younger children fail. In this manner a metric scale of intelligence has been constructed which enables one to determine whether the subject has the intelligence of his age, or is retarded or advanced. Experiments were made not only on elementary school children, but also on adolescent boys and girls, and on soldiers. (8, and 4, p. 124ff.)

By an analogous procedure MM. Binet and Vaney measured the degree of learning, the knowledge, of children; for this they devised a system of questions of the same general tenor throughout. The degree of learning is compared with that of the average child of the same age and the same social condition, and the result obtained is transformed into a notation indicating whether the knowledge of the child is normal or not. (4, p. 23ff.)

In like manner investigations have been made in regard to memory. Pictures representing various objects are shown to children for a few seconds; the pictures are then covered and the children are asked to write from memory the names of the objects seen. Another method, superior to the preceding, consists in having the children study for a definite time a selection of prose or poetry, and then asking each to reproduce what he can recall. The experiment should be tried several times, and, if the material is poetry, note should be

made of the number of lines reproduced immediately after learning and one week later. (4, p. 178ff.)

For several years methods have been proposed for measuring intellectual fatigue; for example, by means of the dynamometer. (6.) Attempts have been made to determine the branch of study causing most fatigue, the influence of physical work on mental fatigue, and the types of fatigue; while the problems involved in the recovery from fatigue have also been successfully attacked. (12, p. 35ff.)

On the important subject of aptitudes almost no investigations have been made. M. Binet has studied two celebrated calculators, Diamandi and Inandi, and has made some observations on different types of intelligence: the reflective and the intuitive, the objective and the subjective, the practical and the literary. He finds himself opposed to the view of Thorndike on the one hand, for whom mind is only a jumbled collection of juxtaposed and quasi-independent faculties, and to that of Spearman on the other, who maintains that intelligence is unitary, that there is within us a faculty which deserves the name of general intelligence, and that there is a correspondence between the degree of even our most widely separated activities. According to M. Binet the truth lies midway between these extremes. It is certain, he says, that one never finds an almost complete independence between one subject of instruction and all other subjects. On the other hand there are no inverse correlations. Excellence in one subject does not imply weakness in another. Finally there exists a faculty which acts in opposition to aptitude, i. e. general application to work.<sup>1</sup> The "*dunces*," according to Binet, are only children whose aptitudes have been misunderstood and who are fitted for, and show themselves successful in, manual labor. The idlers whose slothfulness is

<sup>1</sup> Aptitude means excellence in a particular line. But through close application to different kinds of work a general ability of attacking a subject is developed which tends to equalize the differences in accomplishment due to specific aptitudes.—TRANS.



due to moral causes are a negligible quantity. Their indifference is due either to weakness of intelligence or memory, or to weakness of constitution. (4, p. 237ff.)

But it is not sufficient to examine the mental condition of children. It is not less useful to know their physical condition; for, as M. Binet says, the failures of pupils are often explained by their lack of nourishment, and every one knows how close is the bond between the physical and the moral. Accordingly the height of pupils has been measured, their weight determined, their biacromial<sup>2</sup> diameter taken, and their cranial volume computed. Their muscular strength has been measured by the dynamometer and their lung capacity by the spirometer. Of especial importance are the frequent and careful tests to determine whether the children's vision is normal or defective. At the demand of M. Binet, and in conformity with the report of M. Bonnarie, inspector of the Academy, M. Liard, Vice-Rector of the Academy of Paris, ordered in October, 1907, that the "*optometric scale*" devised by MM. Binet and Simon be used by the instructors in the primary schools of the departments around Paris to determine the condition of the children's vision. The number of pupils whose vision is abnormal has been found to be considerable. It would be no less useful to know the auditory acuity of school children, since, if we are to believe the most recently published statistics, fully 75% of the pupils in France are partially deaf. (2.) Finally, a very happy idea of Dr. Legendre, which he would like to see realized in the whole of France, is a system of individual health cards containing all the information furnished by periodical physical examinations of pupils, and constituting a permanent health record. (9.) It would be desirable to have a similar plan worked out from the intellectual point of view.

But here a question arises which we cannot pass over in silence. Whose duty is it to make all these tests? M. Binet,

<sup>2</sup> The distance between the extremities of the two shoulder blades.—TRANS.

who, like M. Compayre, Inspector General of Public Instruction, has unceasingly encouraged psychological experimentation among teachers, is of the opinion that they alone should assume this task. Only in exceptional cases should and could the physician be called in. By no means does M. Binet overlook the criticisms made by William James; but psychological knowledge ought not to harm those who teach, and however inept teachers may be at the beginning, they are in a position to rapidly acquire an amount of knowledge in this subject sufficient for them to give a good account of themselves in experimenting on the pupils entrusted to their care. (2.) Among the majority of teachers (unfortunately there are some exceptions) we find a great desire to assimilate these new theories and much good will in applying them. Their great need is better training; but one is justified in being very optimistic, after having seen the work done by teachers of abnormal classes.

Besides these tests numerous investigations have been made by M. Binet on the consumption of bread in connection with intellectual work (5); by MM. Binet and Henri on the memory of words and phrases (7); by the "*Société libre de l'étude psychologique de l'enfant*" on rewards and punishments, lying, pupils' plays, undisciplined and rebellious children, and on the measure of memory. At the initiative of the same society M. Malapert has studied the emotion of hatred in children. (14.) M. Chabot, professor of the science of education at the University of Lyons, has undertaken several investigations in that city, among others on the variations of attention, on the difference of mental fatigue in children on different days of the week, and on the subjects preferred by pupils. (5.) An investigation similar to the latter was made in the schools of the north by M. Lefèvre and included 37,000 children. (16.) Researches have been undertaken on the physical and mental condition of pupils and on laggards. M. Languier des Bancels has studied methods of memorizing, M. Binet, children's fears, (3) and M. Vaschide,

the influence of prolonged mental work on the rate of the pulse (17). Some of these investigations have been carried on by the questionnaire method. If all have not given conclusive results they at least show us clearly the direction in which these new studies tend. The results of these investigations have been published chiefly in the "*Année Psychologique*," founded in 1894 by MM. Binet and Beaunis. At first paidology had only a limited space in the volume published by M. Binet and his collaborators, but, expanding year by year, it now occupies almost half the volume. Numerous articles and collective reviews are devoted to the subject.

Moreover, chairs of the science of education have been established,—as, for example, that formerly occupied by M. Marion at the Sorbonne, and that of Lyons, at present held by M. Chabot,—and in 1904 educational conferences were inaugurated under the patronage of M. Liard at the "*Musée Pédagogique*" in Paris. Finally, in 1899 the "*Société libre de l'étude psychologique de l'enfant*" was established in Paris by M. Buisson, professor of the science of education at the Sorbonne, and deputy of the Seine, and placed under the patronage of MM. Ribot, professor at the College de France, and Bédorez, director of primary instruction. M. Binet is its president. This society is composed of physicians and members of the superior, secondary and elementary teaching staff. The members meet at stated periods to report on their experiences or to undertake collective investigations on special aspects of pedagogy. This organization has been called a "*co-operative society for work*," and comprises different committees, each of which concentrates its attention on a particular problem. Five times a year it publishes a bulletin in which are reported all the results of the investigations undertaken.

To the condition of abnormal children the attention of French educators was early directed. Indeed to France belongs the honor of having first established the principles for the education of defectives, and she it was who made the

first attempts at the practical application of those principles. Later she fell behind other countries in the active pursuit of these investigations, and it is only in recent years that she is beginning to regain the position which she formerly held. In 1904 a commission was named by the Minister of Public Instruction for the purpose of considering measures which should provide for abnormal children such education as would be suitable and profitable for them. Certain establishments for retarded children had already been founded by private initiative, as that of Dr. Bourneville, for example, and the Board of Charities had established some schools in hospitals for abnormal children, the most important of which is the Salpêtrière. In 1905 two classes for abnormal girls were inaugurated in the Department of the Seine at Paris, and a class for boys and one for girls at Lavallois-Perret. These special classes, called "improvement" classes, were intrusted to trained teachers who had made a study of the special pedagogy of defectives. In the experimental class started in a primary school in Paris the defectives are not separated from the normal pupils; the latter act as "little mothers" for the young defectives. Older pupils act as monitors, remaining almost the whole day in the class of abnormals and helping the younger ones. A child who has served as monitor does not return for a month or two, in order not to take away the spontaneity of the normal children nor to spoil the defectives. Twice a week the monitors come to give individual instruction to their pupils. Each little teacher serves for a fortnight, and at the end of her period of service she writes a report of two or three pages on what she has observed in connection with her pupil. The following fortnight she is replaced by another, in order that the eager but short-lived zeal of these young tutors may not have time to become exhausted. Of course, this organization is only possible with the very attentive collaboration of the director. (4, p. 334ff.)

The chief aim in the training of defectives is to arouse emulation, and the method of accomplishing this has been called mental orthopedy, in comparison with physical orthopedy for the correction of bodily defects. For this purpose we begin with exercises in immobility; the pupils stand motionless as statues for perhaps one minute once a day. Then they are asked to perform exercises demanding motor control, such as carrying plates full of water. An exercise frequently used is the strength test with the dynamometer. Before each trial, in order to stimulate the pupil, the result of the preceding trial is called out, and while the aim is not to increase the physical strength of the child but to teach a lesson in putting forth effort, it is soon seen that the average of the pressures steadily increases. The objects continually kept in view in the training of defectives are stimulation of attention, memory, perception and will, inculcation of lessons of discipline, *teaching the children how to learn* rather than trying to increase their knowledge,—in short, making them active. (4, p. 150ff.)

Contrary to the old pedagogy, which endeavored to establish an ideal type of pupil and to force every child to conform to this fictitious type as closely as possible, it has been found preferable to estimate the pupil's progress by a comparison with his own previous standing. One cannot too highly praise M. Boitel, director of the Ecole Turgot at Paris, who conceived the idea of constructing graphs as a stimulus to individual emulation. Each week the child traces the curve of his progress from data which he has obtained in the course of his daily work. The ascending, horizontal or descending nature of the curve indicates his standing. (12, p. 71-72.) It is to be hoped that these graphs, successfully employed in classes for defectives, will be more generally used with all classes of pupils. They are already being introduced into a number of institutions.

These early efforts were attended with excellent results, and had a most favorable effect upon the educational prac-

tice of the country. In 1907 two classes for defective boys were opened at Bordeaux at the initiative of Rector Thamin. In the same year, following the meeting of a commission organized under the presidency of Senator Leon Bourgeois for the purpose of studying the means of securing primary instruction for all abnormal and defective children, a bill dealing with this subject was introduced in the chamber, and on April 15th of last year a law was enacted relative "to the organization of 'improvement' classes in public elementary schools, and of autonomous 'improvement' schools for defective children." There was indeed great need of such a law to secure a stricter enforcement of the compulsory education measure of March 28, 1882, particularly since the preceding laws applied to normal children exclusively. It is superfluous to point out the value of instruction especially adapted to defectives, both for their own good and for that of society. Besides, the studies made on them, constituting what has been called "*pathological pedagogy*," may be of great advantage to normal children, just as the medical clinic throws light upon the normal conditions of health.

The most important and most interesting provisions of the law are the following: The annexed classes are to receive children from 6 to 13 years of age. The autonomous schools, since they include part-time and full-time boarding schools, may retain their pupils until 16 years of age. No class is to include children of both sexes, but the autonomous schools may maintain two sections, one for boys, the other for girls, under the same direction. The pupils shall be given a medical inspection at least once each semester, and the observations shall be entered in a book showing the mental and physical history of each individual. A commission composed of the primary inspector, a director or master of a special school and a physician shall determine what children may not be admitted to or kept in the public primary schools and may authorize their admission to a special class or a special school. Finally, a committee of patrons shall be appointed for each

special school, constituting a kind of administrative council. (10.) The teachers must have obtained the "*certificate of fitness for teaching retarded or defective children.*" Candidates qualify by a year's residence in a special establishment and a written examination which tests the candidate's knowledge of the physiology, school hygiene, psychology and pedagogy of defectives. The following indicates the field covered by the examination for this certificate: General characteristics of defective children.—The conditions which give rise to idiocy, imbecility and feeble mindedness.—External appearance of defectives.—Sense organs.—Instincts.—Movements and volition.—Language.—Intelligence and special aptitudes.—Brief outline of medical treatment and hygiene.—Education.—Internal organization of schools.—Courses of study.—Utilization of defectives.—Struggle against the causes. (13.)

As to the organization of these classes the number of pupils admitted to a single section shall be about 15, increasing to 20 in exceptional cases, but never exceeding this number save for certain physical and manual training exercises. Instruction shall be given every day in the week except Sunday and a half day on Tuesday. The time shall be divided as follows:

8:00— 9:30	Recitation.
9:30—10:00	Recreation.
10:00—11:30	Recitation.
1:30— 3:00	Recitation.
3:00— 4:00	Recreation.
4:00— 5:00	Recitation.

Each recitation shall be broken by a short intermission. (1) It will be well to give the course of study entire, as well as the accompanying instructions.

#### COURSE OF STUDY.

Paper folding, box making, measuring, weighing, construction and joining in cardboard and wood.

Singing.

Supervised plays and games.

Walking, and working in the garden.

Free drawing, copying, and modelling in clay.

Exercises in pronunciation and articulation.

Rudiments of reading and writing, with attention to the mechanics of the activities involved. Ask numerous questions on the meaning of words, the why and the how of things.

First exercises in number. Counting from 1 to 10, 10 to 20, 20 to 50, 50 to 100, etc. Have the pupils handle and combine concrete objects. In the later years teach them computation, i. e. addition, subtraction, and multiplication of simple numbers, always making use of concrete objects.

The elements of geography. Study the shape and the details of the earth's surface, beginning with the topography of the garden, the school, the district, etc.

Object lessons: the study of ordinary objects placed before the children. Describe their color, form and use. Make use of frequent repetitions.

Lessons in practical life. Tell stories, anecdotes and short biographies, and have the children relate them in answer to questions. From these stories draw lessons of practical morality.

Beginning of instruction in the simplest tasks of the workshop and the garden. Special gymnastic exercises.

#### GENERAL INSTRUCTIONS.

Teachers are to follow the program of the primary schools in so far as it is adapted to the abilities of their pupils. Very frequently they will have to rest content with reading, writing and the elements of number. They will endeavor to gain and hold attention by the attractiveness of what they show and say, and by the variety and novelty of the exercises. They are to use word for word recitations only with discretion, and are to avoid definitions, rules and formulae. They are to make sure that pupils use in recitation only those words



and phrases whose meaning is understood. They will very frequently have recourse to object lessons. Instruction shall be given by the direct presentation of objects, by pictures, and by familiar stories which direct the attention of the children to the observation of action and of life.

Particular attention shall be paid to the following exercises:

1. Singing and music, of which defectives are usually very fond.

2. Exercises in language and articulation, to correct the faults of pronunciation usually frequent in this class of children.

3. Simple and rational gymnastics, avoiding all trace of athleticism, and, where possible, making use of a musical accompaniment to rhythmize the movements.

4. Plays and games of speed and skill, organized and directed by teachers so that the apathetic and obstinate children will not be isolated from their comrades.

5. Lessons in practical life, such as will put the defectives in a position to support themselves and adapt themselves to their surroundings. The smallest children should be taught to wash and dress themselves and to have good manners at table; the older ones should be taught how to behave in company, to write a letter, to count their money, to save it, and to find their way about; the most intelligent should be taught some ideas of elementary hygiene, and especially the rules of morals, as these are particularly important for young girls of weak intelligence, who are the more exposed on account of their feeble-mindedness.

6. Manual training. The aim of the "improvement" schools is not merely to secure for defective children the instruction to which they have a right, but to prevent their becoming a burden on society. Thus their instruction in manual training should be clearly directed toward apprenticeship and its concrete applications. Especially in the separate "improvement" schools, which keep their pupils until they are 16 and

18 years of age, should manual training be developed.<sup>1</sup>

In the rural districts the pupil should be directed preferably to agricultural pursuits. For this reason it is desirable that a school garden should form a part of the equipment of every "improvement" school.<sup>2</sup>

In urban communities the workshops should be conducted with a view to a rational and complete apprenticeship in accordance with local needs. Simple occupations which can be pursued anywhere are the best, such as woodworking, iron work, garment making, shoemaking, embroidery, etc., taking care that the trade chosen be completely learned.<sup>3</sup>

From the preceding discussion one can see how much progress pedagogy has made in France in the last few years, and how greatly the scope of its activity has been broadened. The movement is progressing methodically, though too slowly. Its advance is due in great part to M. Binet, whose name I have mentioned so often in the course of this article, and who is at present the uncontested chief of the new pedagogy in France; but in spite of his efforts, in spite of the efforts of his collaborators and of other men not less eminent, there still remains much to be done, especially in the way of practical applications, and it is just in order to further the move-

<sup>1</sup> Half the time, sometimes more, is to be devoted to exercises in manual labor. It is necessary to catch the child's attention, to stimulate and perfect his powers of imitation, then by observation, by reflective analysis of his own and of the teacher's movements, and by the examination of his tools, their proportions, and their relation to the task in hand, to develop his judgment, so that when he is confronted by a new task an appeal may be made to his memory and to his reasoning powers.—*Instructions relative to special schools*. Bulletin de l'Instruction Publique, 28 Aout, 1909.

<sup>2</sup> In rural localities the children are to be given special training in the work of gardening and agriculture. These are the occupations which they will prefer and in which they will succeed best, and in these they will most readily find employment when they leave the school.—*Ibid*. Bulletin de l'Instruction Publique, 28 Aout, 1909.

<sup>3</sup> In the urban centers one or more workshops are always to be connected with the school. The trades chosen should be the best known and the most easily learned,—those whose manufactured products can be most readily disposed of in the region.—*Ibid*. Bulletin de l'Instruction Publique, 28 Aout, 1909.

ment of pedagogy in this direction that M. Binet has recently written his very interesting and authoritative book *Les idées modernes sur les enfants*, from which I have so freely borrowed.

In conclusion, let me express the hope that the applications of pedagogical research may become more numerous from day to day, that the number of those who contribute to spread these ideas may increase, and that their efforts, so worthy of interest, may be crowned with well deserved success.

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## COMMUNICATIONS AND DISCUSSIONS.

### NOTES ON THE RECALL OF NONSENSE SYLLABLES.

In the course of a discussion of the experimental psychology of memory before a class of Sophomores in educational psychology last year, I placed upon the blackboard for memorization the following series of nonsense syllables: *Pra, ver, spe, iss, mey, oph, lom, bry, der, cul*. These were read by each student until a single correct reproduction could be made, were then erased and were not referred to subsequently.

One of my students, Mr. C. W. Hagen, Jr., now reports that, while walking along the street recently, he chanced to think of his work in that course, visualized the room in which the class had met, and found to his surprise, that this list of nonsense syllables suddenly came back to him. At my request, he wrote out the list (which he had originally learned, and which he now recalled, in auditory terms) as follows: *Pre* (pronounced *pray*), *ver, spe, ish, meh* (pronounced *may*), *oph, lum, bre* (pronounced *brce*), *der, cul*. In auditory terms, therefore, the series as reproduced some nine months after it was learned contains only two minor errors, *ish* for *iss* and *lum* for *lom*; the order is correct.

In view of the many records of exceptional recall, this incident cannot be said to be at all extraordinary, but it seems to me to be at least unusual, because (1) the material was nonsense syllables and hence unrelated to the observer's general stock of ideas; (2) the original learning had been done as a mere incident in the day's work, with no intent to secure permanence, and (3) the recall took place in a certain sense spontaneously, in so far as the observer was not at the time trying to recall the list or thinking expressly of memory tests.

I was tempted to rate Mr. Hagen's performance as quite exceptional. A few days later, however, opportunity offered for the testing of 13 other members of the class. One student, Miss C. M. Stivers, then reproduced the original series as *pra, ver, spe, iss, me, opf, lum, bra,—,—*, which shows an approximately correct auditory recall of eight of the ten syllables. For a further test, the ten syllables were written in 'helter-skelter' order on the blackboard, and the students in question

were asked to essay their proper arrangement by the 'reconstruction' method. Miss S. accomplished a perfect series. Five students were quite unable to arrange the syllables; seven others made the attempt with varying success. These last records were graded by the simple, though arbitrary plan of computing for each syllable given, the number of 'steps' it had to be moved in the series to bring it to its proper position, with the result that the scores 2, 14, 18, 22, 24, 44 and 48 were secured. The last two indicate virtually a chance arrangement.

It seems to me that, from the point of view of the teaching of educational psychology observations such as these have some value for classroom illustrations of the nature of retention and recall. For one thing, although we not infrequently believe that we recall exactly the details of some long forgotten incident, we have, as a rule, no means of verifying this belief, and it is a fair presumption that the seeming exactness of the recall is largely illusory. Here, fortunately, the original experience was a matter of record.

Again, students are often interested in the familiar query: is anything absolutely forgotten? The stock instances to the contrary, such as Coleridge's servant-girl story, although so striking in nature, are felt to lack, in a way, that certainty or reality which a less striking instance like the present one, drawn from the experience of classmates, may serve to supply.

It would be a simple matter for instructors in educational psychology to extend these observations and to obtain, perhaps, valuable statistical evidence of the possibilities and nature of long-term retention and recall of nonsense syllables.

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### BASEDOW'S ELEMENTARWERK.

I am anxious to turn the attention of all who are interested in the history of educational psychology to the excellent new edition of Basedow's *Elementarwerk*, which Ernst Wiegandt has published in Leipzig (Stechert, New York). The text fills two volumes and the third volume contains a hundred plates with Chodowiecki's famous illustrations. The whole is edited and introduced by Fritzsche and Gilow. It is prettily bound in the style of Basedow's time. The volume of pictures alone is an inexhaustible source for the study of culture in the eighteenth century

and at the same time a real work of art, as the reproduction of the masterly coppers is perfect. But still greater interest ought to be aroused by the two volumes of text, which with their system of educational philanthropism offer much material which has not only historical interest, but manifold suggestion for the modern student of pedagogy. A book which has been so extremely influential for the growth of educational ideas ought to be welcomed in every teacher's library.

HUGO MUENSTERBERG.

Harvard University.

### THE BOSTON MEETING OF THE NATIONAL EDUCATION ASSOCIATION JULY 2-8, 1910.

Since the National Education Association is the great national organization expressing the high regard in which public, universal education is held in this country, its proceedings are worthy of consideration as an indication of the general trend of educational sentiment and activity throughout the United States. To present in a few pages the substance of the addresses and discussions at these meetings is no easy task, so varied were the interests of the convention, so many were the section meetings in progress at the same time. Including the general sessions, the Council, the various departments, and the affiliated societies there were 28 sections in session during the week, many of them meeting at the same time in different parts of the city, and at these meetings more than 200 papers and addresses were given. It must suffice, therefore, to merely comment upon certain dominant tendencies of the convention.

In spite of the fact that the railroads, by their reluctance to grant favorable rates, discouraged many from coming, there was a goodly attendance representative of all parts of the country. The *Boston Transcript* gave the total registration of both active and associate members as 17,000, which was about half the registration at the Boston meeting seven years ago. The pleasant weather and the very cordial hospitality of the people of Boston combined to make the occasion a delightful one for the visitors. The section meetings were held almost exclusively in the mornings, the afternoons were devoted to social functions and sight-seeing excursions, and in the evenings the general sessions convened. One of the attractions of the convention was the address of President Taft at the Harvard Stadium, July 4. The President took as his subject the declaration of independence as conceived

by the founders of the republic, interpreted by Lincoln in the emancipation of the slaves, and applied to present-day conditions in the Philippines. The speaker defended the policy of the United States in those islands as exemplifying in the highest possible manner the fundamental conceptions of the declaration of independence, and made an eloquent plea for the education of the Filipinos in the principles of liberty and self-government in order that they might soon become completely free and independent.

The topic most prominently in the foreground during the deliberations of the Association was probably that of vocational and industrial education. At least 50 of the addresses were concerned more or less directly with the problems involved in such education, and a number of supplementary conferences were held. The subject was introduced at the sessions of the National Council by the discussion of the "Report of the Committee on the Place of Industries in Public Education." Professor Charles R. Richards, Director of Cooper Union, New York City, presented the report of the committee, and showed that industrial schools should be related to the industries of the locality which they are to serve. Dr. Jesse D. Burks, Director of the Bureau of Municipal Research, Philadelphia, held up to ridicule the so-called manual training work of the elementary schools, claimed that real manual training had never been tried, and urged the establishment of experimental elementary schools in which the whole course of study should be dominated by the vocational idea. Dr. David Snedden, Commissioner of Education for Massachusetts, speaking of intermediate industrial schools, discussed the kind of training necessary for boys and girls from 14 to 16 years of age,—pupils whose need of vocational education is doubtless most acute. He deplored the tendency to bookishness which characterizes many industrial schools, and asserted that "vocational education demands concrete, productive, practical work that will fit boys and girls to earn a living." Book knowledge should be resorted to only in answer to questions which develop out of concrete vocational situations. It is worse than futile to try to teach vocations from books. Vocational education should provide a basic equipment for the industries. Just what constitutes such basic equipment for any group of industries can only be determined by careful study and experimentation within the group. Superintendent Charles T. Keyes, of Hartford, Conn., dismissed industrial education in the high school with the statement that it could only be profitably considered after

the problem had been solved for the upper grammar grades. At present there is no demand for it.

The undue prominence of bookishness in science education was mentioned by Professor W. J. V. Osterhaut, of Harvard University, before the department of secondary education as a reason why the vocational idea should receive attention in the high schools. "The introduction of material from agriculture and household arts will put an end to a most unfortunate kind of instruction now prevalent, namely, instruction by teachers who have only a book knowledge of their subject. Further, it will enable the pupil to make immediate application of his knowledge, and so make it a vital part of his mental equipment. Best of all, it will lead him to inquire and experiment for himself." At the same time, according to Professor W. R. Hart, Amherst Agricultural College, there will be a desirable reduction of the amount of science taught in the high school. Much of past science teaching has not been adapted to the learner's mind. "Only those sciences deserve to be widely studied whose facts have become socialized, i. e., intimately related to the vocational life of the people." Professor S. B. McCready, Ontario Agricultural College, continued in the same vein regarding the teaching of botany. "It is not so much botany as plants; not so much plants as pupils; not so much the logical development of a science as a preparation for life. The teaching is not for the sake of a subject, but for the sake of a boy or girl who is to 'live a life and to make a living.'"

Arthur B. Dean, Chief of the Department of Industrial Education, New York State, recommended a grouping of pupils at the end of the sixth grade into classes leading to (1) the present high schools, (2) higher business schools, (3) higher industrial and agricultural schools. Such a segregation was opposed by others on the ground that it would create undesirable class distinctions, and that teachers and principals have at present no satisfactory basis on which they may determine the natural aptitudes of pupils. Furthermore, it is a well-known fact that life interests and their corresponding aptitudes frequently do not develop until a much later period.

That this matter of natural aptitudes and capacities is a crucial question in vocational education was fully recognized by Mr. Frederick P. Fish, President of the Massachusetts State Board of Education, in his discussion of "The Vocational and Industrial School." Mr. Fish said, in part: "The two things of the greatest importance for each



child are these: First, he should be understood. His physical and mental capacity, his character, tastes and inclinations, points of strength and weakness, the direction in which he can best be developed, should be known. Second, he should be trained and developed not on conventional lines, but in that way which is most effective for him in view of his special character and aptitude. Each child should be studied individually, and it would be a great gain to our race if parents themselves could be trained for this important duty."

At present, however, since parents lack the requisite training, the task will necessarily fall upon the teacher, and it is incumbent upon our institutions for the training of teachers to make better provision for this kind of individual child study. The study of the individual and the need of experimentation on the part of teachers in training to find out the kind of children they are best fitted to teach were the central thoughts of the address by Miss Emma L. Johnston, Principal of the Brooklyn Training School for Teachers, on "Training for Teaching." Everybody can teach somebody, but it is the duty of those in charge of training schools to help students to find the kind of teaching for which they are fitted, and thus prevent the lamentable waste of energy seen in the case of the "misfits."

The vocational idea was also prominent in the address of ex-President Eliot, of Harvard, on "The Value During Education of a Life Career Motive." Mr. Eliot urged greater emphasis on household and practical arts in elementary education, in order that the interest of pupils might be maintained by the evident vocational aim of their school work, and that they might be kept in school as long as possible. The actual training for a trade should be postponed until 16 years if possible. "Children with natural gifts and tendencies should be turned toward appropriate occupations by the teacher in consultation with the parents. Children who know their own minds by the time they are 14 years old should be helped to the life work which attracts them."

That the child's interests should be carefully studied and the work of the school adapted to them was emphasized by Superintendent H. B. Wilson, of Decatur, Ill., in his plea for a better motivization of the work of the elementary schools. "The school's first step in the solution of this problem is the discovery of a series of motives, varying from year to year and with different teachers, which seem to be normal to the children of a given community in each of the grades or years of the school course." This accords with the appeal made by Profes-

sor Judd last winter for a more careful and extended study of children's interests. We have books galore on abstract "interest," but we have little definite knowledge of the actual interests of children. That merely shows how much easier it is to theorize than to collect facts, and it is gratifying to find practical educators calling for the collection of such data as educational psychologists are anxious to see amassed. When principals and teachers become investigators the science of education will advance much more rapidly. A special opportunity for the study of interests is found in the English work of the schools, and the moral of the paper on "English as She Is Taught," by Superintendent Adelaide Steele Baylor, of Wabash, Ind., was that too much of the English work takes no account of children's interests.

President James W. Crabtree, of the Nebraska State Normal School, in discussing the "Criticisms of the Public Schools by the Laity," thought that the most important criticism and the one most worthy of consideration might be voiced as follows: "The school does not attach enough importance to what the pupil is to do immediately on leaving his studies. We must either keep our children out of the high school a portion of the time and teach them how to work and to love work, or else the schools should in some way meet this need. And why may not the schools do this service for our children?"

How the schools may meet this demand is a problem requiring extended investigations, and to correlate such investigations and make them effective and useful is one of the chief functions of the United States Bureau of Education. Commissioner Brown, in presenting his "Message from the Bureau of Education," advocated such an extension of its activities that it might become a clearing house for educational questions, formulating problems, starting investigations, and reporting results to the public at large. "Industrial education in its three main forms of trade schools, schools for housekeeping, and schools for rural life is every day raising more questions than anyone yet can answer," and a properly equipped Bureau could render great assistance by keeping watch on all questions of research in this field.

A second prominent topic in the discussions of the convention, although it did not receive as much attention as vocational education, was that of the exceptional child. Superintendent James H. Van Sickle, of Baltimore, presented the subject to the Council in the "Report of the Committee on Exceptional Children." In this report and in the discussion which followed it stress was laid on the need of skilled

psychologists and physicians for more accurate diagnosis of so-called defectives and incurables. What was not sufficiently emphasized is the desirability of more extensive studies of normal children by psychologists in order to establish norms or units of measurement of intelligence for given ages and grades, so that we may have some basis for a diagnosis of the degree of mental defect. At present school administrators do not realize the importance of such studies, and tend to discourage rather than encourage them. There was some discussion as to the advisability of removing defectives from the regular schools, and it was pointed out that parents and associations frequently show a decided prejudice against special schools. Perhaps the "special class" is the most satisfactory solution.

The meetings of the Department of Child Study were devoted very largely to the consideration of exceptional children. Dr. Maximilian P. E. Groszmann reviewed the symptoms of nervousness and other troubles of young children which might be taken as "danger signals" for their healthy development, and entered a plea for the better training of teachers in the diagnosis of such troubles. Dr. S. Philip Goodhart, of New York City, besought consideration for those atypical children who are frequently censured for perversity, moodiness or inattention or who are thought dull and stupid because of abnormal shyness, sensitiveness or absorption. Such individuals often show unusual intellectual attainments later in life, and if they were understood and properly treated in school they might show a much larger percentage of usefulness. These atypical children must be trained in power of concentration, and must have their perceptive and apperceptive powers exercised. Here again the burden falls on the teacher, and unless she has been trained to take something of the clinical attitude toward her pupils she will fail in her task.

State Superintendent Robert J. Aley, of Indiana, presented the claims of the exceptionally gifted child. Work with defectives is worth while, but work with exceptionally able children is far more worth while. "The forward movements of civilization are never led by the average man or by the masses of the people. They are always under the direct leadership of an individual who, because of his superior abilities and attainments, has stepped out of and beyond the crowd. The world has constant, continual need of leaders. Too many of the leaders of the past have been forced to train themselves in the school of experience. The ordinary school has failed to meet the needs of such students."

Superintendent Aley's address is in harmony with a vigorous agitation now carried on in Germany under the leadership of the great physical chemist, Professor Wilhelm Ostwald, for the more adequate consideration of bright pupils in the schools. We hope to give our readers a more extended account of Professor Ostwald's arguments in a later number of this JOURNAL.

At other meetings Professor Wm. H. Burnham, of Clark University, discussed the "Hygiene of Instruction," and Dr. H. H. Goddard, of Vineland, N. J., spoke of the relatively large group of feeble-minded children who have never been recognized as such, who clog the work of the regular classes and yet do not get adequate attention themselves, and who ought to be examined and placed in special classes. President G. Stanley Hall outlined the work of the National Child Welfare Conference and urged teachers to utilize their opportunities for scientific study. Dr. Frank G. Bruner, of the Child Study Department, Chicago, gave an interesting account of the education of the blind in schools with the seeing.

One of the most interesting of the general sessions was that at which President Lowell, of Harvard, discussed the subject of formal discipline and the transfer of training, on the basis of an investigation into the connection between success in the law and medical schools and previous success in college. This subject of the transfer of training the speaker characterized as the most interesting and vital topic for educators at the present day. Investigations seem to show that capacity acquired in one study, so far as it is dependent on subject matter, cannot be transferred to another; so far as it depends on method of study, it is transferable to a considerable extent to studies where the same method is applicable; so far as it depends on general conceptions or general moral and intellectual attitude, such as intensity of effort, diligence, etc., it is transferable indefinitely. President Lowell showed a diagram exhibiting the standing of men in the Harvard Law and Medical Schools from 1898 to 1908, and expressed his surprise to find that college excellence in history was apparently of little assistance to high standing in the law school, and that the same was true of science in the medical school. "The conclusion to be drawn would seem to be that it made comparatively little difference in regard to a man's success in the professional schools to what subjects he devoted himself mainly in college, but that it made an enormous difference how and with what power, ability and success he worked in college. The figures might

show either that a man was born with the qualities which would enable him to gain honors both in the college and in the professional schools, or that he who has worked hard in college has acquired a power he would not otherwise have, and therefore succeeds in the professional schools. Pedagogically the figures seem to mean for persons of mature age either that ability acquired in one branch of study as a method of thought and work is transferable to another to a very considerable extent, or that the general intellectual and moral attitude is far more important than the method."

Dr. Snedden, addressing the Department of School Administration on "The Need for Better School Reports and Publicity," said: "The published school report is a communication to the public. Its aim is to inform the public as to what has been done in the schools, and what should further be done by and for the schools. It is probable that the first appearance of school reports should be in the form of successive bulletins, each one dealing briefly and forcefully with some particular educational issue. The public has a right to have its questions regarding education answered; but it must be made a matter of common knowledge that there are types of questions which cannot be answered out of our available knowledge. In other words, statistics in education only affect certain regions; others are not reached at all. We have lately learned how to measure retardation, and we are striving to measure the causes of retardation. So far, however, few have suggested that we can measure the relative values of different studies in terms of the results they produce. This being so, it is difficult to answer the general question, 'How much does a given type of educational procedure pay?' For this purpose we need better units of measurement and standards of comparison."

After a rather stormy business meeting Mrs. Ella Flagg Young, Superintendent of Schools, Chicago, Ill., was elected president of the Association for the ensuing year.

J. C. B.

#### NOTES ON THE SESSION OF THE PLAYGROUND CONGRESS.

JUNE 7-11, 1910.

The session of the Playground Congress held in Rochester, June 7-11, was notable in several particulars.

One noted the evident expansion of the playground movement to a more vital relation with public recreation and amusement. The city's interest in the play life of its people must necessarily be concerned with

the theatre, the nickelodeon, the dance hall and public celebrations, not only as they are related to the young people, but also to the men and women workers of the community. The leisure time of a people is worthy of sane, thoughtful, wise guidance in all of its various avenues.

One also noted the possibilities of a closer relation of the public schools to the movement. Rochester, as a seat of the social-center movement in public school buildings naturally called attention to this feature. The general participation of the public schools in the musical and play festivals of the week added further suggestions along this line and brought to consciousness the tremendous possibilities and power of the public schools and public school teachers, if once they should bring their strength and opportunities to bear upon the play life of the community.

One noted also the tremendous popularity and rapid extension of the movement in general, the many and far cries from all over the country for guidance and help—with some concern, because of the sense of lack of ways and means to meet adequately the needs of all. But one noted also among many a spirit of comradeship, a tightening of belts, a drawing of breath, a setting of teeth, that promises a fight to the finish together for the Playground Association of America and its work in the world.

G. E. JOHNSON.

Pittsburg, Pa.

## ABSTRACTS AND REVIEWS.

R. M. YERKES. *Modifiability of Behavior in its Relation to the Age and Sex of the Dancing Mouse*. Journal of Comparative Neurology and Psychology, 19: 1909, 237-271.

R. M. YERKES AND J. D. DODSON. *The Relation of Strength of Stimulus to Rapidity of Habit-Formation*. Journal of Comparative Neurology and Psychology, 18: 1908, 459-482.

The value to comparative and educational psychology of systematic and exact studies of methods of learning and of the effect of experience in modifying behavior cannot be doubted. Such a study of the dancing mouse is reported in the two papers cited above. They are a continuation of similar studies described in the author's book on the dancing mouse.<sup>1</sup>

The experiments fall into five main groups: (I) The relation of age and sex to rapidity of acquisition of a visual discrimination habit. (II) Sensitiveness to electric stimulus in its relation to age and sex. (III) Strength of electric stimulus in its relation to rapidity of habit-formation. This subject is treated in detail in the second paper. (IV) Relation of difficultness of discrimination to rapidity of habit-formation at different ages. (V) Relation of age to rapidity of acquisition of labyrinth habits.

The method used in groups I-IV is essentially the same. The habit to be formed is that of discriminating between two passageways or boxes, one of which was marked by a black cardboard, the other by a white, and of choosing the white one. A wrong choice was punished by means of an electric shock from wires on the floor of the boxes. In group II the strength of the electric current could be regulated and varied and in group III it was measured accurately.

In the first series of experiments, those on the relation of age and sex to rapidity of acquisition of the habit, ten mice were used, five males and five females, for each of the ages of one month, four, seven and ten months. The results of the experiments which are presented

<sup>1</sup> R. M. YERKES. *The Dancing Mouse: a Study in Animal Behavior*. New York: The Macmillan Company, 1907, xxi, 290.

in a number of tables and charts may be summarized as follows: (1) The dancers of both sexes at one month of age acquire a particular white-black visual discrimination habit more rapidly than do other individuals. From this time until the seventh month there is steady decrease in rapidity; from the seventh to the tenth month the reverse is true. (2) Young males acquire the habit more quickly than young females, but later the females acquire the habit more quickly. (3) Curves of learning for the sexes indicate that the female makes more mistakes early in the training tests than does the male, but this soon gives place to greater accuracy of choice on the part of the female.

In the experiments of group II ten pairs of mice were tested as to the threshold value of the stimulus for the individual, with the following results: (1) the males appear to be somewhat more sensitive than the females; (2) there is no indication of change of sensitiveness with increase in age; (3) individual differences in sensitiveness are more marked than sex or possible age differences.

The experiments of group III form a thorough quantitative study. Three sets of experiments were tried: In Set I the amount by which the two passages or electric boxes differed in brightness was medium and the ease of discrimination was medium; in Set II the difference in brightness was great and the discrimination was, therefore, easy; in Set III the difference was slight and discrimination difficult. Three degrees of strength of stimulus were used in Set I, five in Set II, and four in Set III. The exact values are given in figures, but they are designated in general as weak, medium and strong.

From the results obtained in this work the authors have formulated a law of habit-formation: "As difficultness of visual discrimination increases that strength of electrical stimulus which is most favorable to habit-formation approaches the threshold. The easier the habit the stronger that stimulus which most quickly forces its acquisition; the more difficult the habit the weaker the stimulus which most quickly forces its acquisition."

In group IV the experiments of group I were repeated under somewhat different conditions. The results appear to be contradictory and emphasize the importance of the conditions of visual discrimination. They go to show that under the conditions of easy discrimination the old mice learn more quickly than the young ones; that, however, the young mice possess better discriminating ability or acquire that ability more rapidly. In other words, the educability of white-light vision of



the young mice is greater than that of the old ones, but, on the other hand, associative memory is more prominent in the old mice.

In order to test further this latter result young and old mice of both sexes were trained in two labyrinths, at first in labyrinth D and one month later the same individuals in labyrinth C. Comparing the young with the old males it was found that the latter acquired the habit in both labyrinths more quickly than the former. In the two groups of females, however, there was practically no difference. The evidence, therefore, seems to favor the conclusion that associative memory in the dancer improves during the first year of life.

A number of these experiments are to be repeated with other animals, but it seems allowable to draw certain general conclusions from this work with the dancing mouse, which may be of importance in both comparative and human psychology.

(1) In the earlier experiments it was noted that the females at the beginning of the series made more mistakes of choice than the males, but they very soon began to choose with greater accuracy and ultimately acquired a perfect habit sooner than the males. The number of errors at first apparently gave the animals that experience which enabled them to adjust themselves more rapidly and to learn therefore more quickly.

(2) The strength of the electric stimulus which is used as an incentive for habit-formation is extremely important as a determinant of rate of habit-formation. For a given animal and condition of visual discrimination there is a certain strength of stimulus which is most favorable for the acquisition of the habit (optimal stimulus). It is very necessary before undertaking to study the intelligence of a particular animal that the experimenter determine the value for it of the several factors which constitute the chief conditions of activity. That a number of laws of habit-formation may thereby be discovered cannot be doubted.

(3) The acquisition of the visual discrimination habit apparently depends in the dancing mouse upon two important and to a certain extent independently variable conditions: (a) ability to sense the difference in illumination of the two boxes or to gain that ability (educability of white-light vision); (b) ability to associate the darker box with the electric shock (associative memory). If this should hold true of other animals it is evidently important that the senses be trained early in life and that associative memory be especially developed later.

Cambridge, Mass.

ADA W. YERKES.

HELEN THOMPSON WOOLEY. *The Development of Right Handedness in a Normal Infant*. Psychological Review, 17: January, 1910, 37-41.

Mrs. Woolley has repeated, in substance, the experiments of Baldwin upon the use of right or left hand in infants in reaching for colors or other attractive objects. Her results confirm Baldwin's conclusion that 'reaching,' i. e., picking up an object so situated as to require some effort to secure it, calls out the use of the right hand almost exclusively, and this even at the close of the 7th month (Baldwin's observations were made in the 9th month), when general observation under non-experimental conditions shows no signs of preference for either hand.

In another instance the child had come, through the circumstance of being held always in such a way as to leave her left hand free at the time, to use her left hand only in waving 'bye-bye.' At 15 months, this habit had been completely broken up and a persistent right-hand habit had been substituted for it.

In her ordinary activities right-handedness had become evident to casual observation by the end of the 9th month.

Mrs. Woolley concludes that "right-handedness must be a normal part of physiological development, not a phenomenon explicable by training."

CORNELIUS HOOD.

C. H. JUDD. *On Scientific Study of High-School Problems*. School Review, 18:2, Feb., 1910. Pp. 84-98.

In this paper Professor Judd presents a strong plea for the application of scientific method to the study of the pressing problems of secondary education. Such study does not necessarily involve elaborate apparatus or unusual conditions. On the contrary Professor Judd maintains that even the ordinary examination may form a fruitful source of data. A study of different sets of papers written in answer to the same questions will reveal differences in the type of instruction, in the ability of pupils at different ages and in the emphasis that different teachers have placed upon the various phases of the subject. Another source of data is to be found in the records that are kept for administrative purposes. A system of marking may be much more equitably applied, for example, if every teacher knows the average mark of the pupils in the school, and the highest and lowest marks. A third and very important source of data is readily accessible in the variations that are being introduced in the organization of secondary science. The

need here is to keep an accurate record of the results obtained under different types of organization. "We lose more pedagogical experience every year than would be required, if put in permanent form, to make the most valuable book on education ever written."

W. C. B.

J. DEWEY. *Science as Subject-Matter and as Method*. Science, 31: 787, January 28, 1910. 121-127.

This paper embodies the address which Professor Dewey delivered as chairman of Section L, A. A. A. S., at the recent Boston meeting. His fundamental thesis is that science has not justified its early promises as a part of the educational curriculum. Among the causes that have contributed to this partial failure of science in the schools, the most important, Dewey believes, is the point of view from which the sciences have been taught. He maintains that the informational or subject-matter value has been uppermost in the minds of both teachers and pupils, to the neglect of the method-value. The aim of science teaching should constantly be to give the pupil the scientific attitude and habit of mind. This can be accomplished only by leading the pupil to "take a hand in the making of knowledge, by transferring guess and opinion into belief authorized by inquiry."

If the science of the secondary school is not now taught with this value in mind, it is not because the value has remained unnoticed and unemphasized by those who are regarded as authorities in the field; and, indeed, both the organization of secondary courses and the spirit of instruction seem distinctly to represent an attempt to realize just this disciplinary value. The Report of the Committee of Ten which has had so marked an influence upon secondary education certainly did not emphasize the informational side of secondary science as contrasted with the method-side. There are those who maintain that it is this disciplinary attitude that has caused the relative falling off in science-registrations during the past ten years, and that the only hope of secondary science is to drop the vestments of pure science and assume the economic garb. There is a possibility that this course might do rather more even to realize the disciplinary values as Dewey conceives them than the present organization of the sciences is now accomplishing in the secondary school.

W. C. B.

WALTER D. SCOTT. *Personal Differences in Suggestibility*. Psychological Review, 17: March, 1910, 147-154.

Scott's object was "to determine to what extent suggestion is a general faculty and therefore to what extent individuals could be ranked as to the degree of their suggestibility." His method was to subject the same group of college students to two tests of suggestibility and to correlate their scores in the tests by the Pearson formula of correlation.

The first method was based upon the observation of the flight of after-images following exposure for 20 sec. to white light. The normal sequence of colors is said to be blue, green, red, blue and the red stage is said not to begin normally until more than 20 sec. after the first appearance of color. The experimenter, by exhibiting before the test mounted spectral charts, prisms, color-disks of the spectral colors and by certain verbal statements, sought to convey to the observers the notion that the flight of colors would follow the order of the spectrum, and after each exposure, sought to augment this suggestion by asking such questions as: "Is it red yet? Now is it red, etc.?"

The second method consisted in sending a 110-volt, direct current through a bank of lamps and through a coil of naked German silver wire, with the relation of current and wire so adjusted that the observer, when holding the coil of wire between his fingers, felt an appreciable rise in temperature in from 5 to 10 sec.

A concealed switch enabled the experimenter, at will, to admit the current to the resistance coil or to shunt it off entirely, without disturbing the illumination from the lamps. Twenty trials were given: in the first ten the coil was really heated, in the second ten the coil was not heated, unless at the expiration of a certain time the observer had failed to report warmth.

The correlation of suggestibility in these two tests proved to be insignificant. The question arises: does this indicate that there is no such thing as general suggestibility, that it is impossible to speak of an observer as being highly suggestible or to rate him in suggestibility at all; must we speak merely of suggestibility to warmth-illusion, suggestibility in observing after-images, etc., or were the conditions in the two tests so dissimilar that the coefficient of correlation was reduced on that account? Scott points out several differences in the conditions of experimentation that might have reduced the correlation, and suggests several modifications in the first method that might have made it more similar, psychologically, to the second.

It seems to the reviewer that the second test might have been modified very simply by giving all of the heat-tests without objective warming of the coil. This variation in method should be tried before it is finally concluded that the suggestibility of an observer varies from test to test, without being affected by any general mental disposition such as most writers have in mind when they speak of an individual's suggestibility.

A more serious criticism may be directed against the flight of color test. Suggestibility is assumed to be demonstrated, as we have noted, by departure from the "normal sequence," blue, green, red, blue,—a sequence apparently taken from Helmholtz. Now the flight of colors after exposure to white light has by no means a normal sequence. In the second, or negative stage, the sequence red, blue, green, is, to be sure, very constant and obtained by most observers under somewhat varied conditions; but the first or positive stage is essentially variable; what is seen depends (*a*) upon individual differences in the functioning of the retina, (*b*) upon the amount of practice the observer has had, (*c*) upon the degree of adaptation secured before the exposure, (*d*) upon the extent, intensity and duration of stimulus. Scott gives us no exact statement of the degree of adaptation, and it is fair to assume that the intensity of the stimulus varied with the condition of the sky. If adaptation lasted five minutes, the positive image would often show patches of red or of green within the first 10 seconds, and if the illumination were much diminished, the first image would be reddish white. It follows that the report of red within 20 sec. is not, as Scott assumes, a clear demonstration of suggestibility. If this criticism be correct, the whole argument against the existence of general suggestibility, so far as Scott's work goes, falls to the ground.

C J. ROGERS.

BORIS SIDIS. *An Experimental Study of Sleep*. Boston: Richard G. Badger, 1909. Pp. 106.

Dr. Sidis has made a significant contribution to the study of sleep through a series of laboratory experiments on frogs, guinea pigs, cats, dogs, and infants. He finds that the condition of sleep is similar to the condition produced by suggestion, both normal and abnormal. In these experiments he followed somewhat the same method as in experiments upon suggestion—monotony of stimulation and limitation and restriction of voluntary movements—and produced similar results. Before

passing into the sleep state the subjects experimented upon passed through the hypnoidal or subwaking state. The same was noticed upon passing out of the sleep state. This intermediate state is brief and very unstable and oscillates between the waking state and sleep or hypnosis.

In part II the author formulates his theory of sleep in terms of cell energy and stimulus exhaustion. Living tissue responds to an external stimulus with some discharge of energy. The ability to respond has a certain limit. If the intensity of the stimulus remains the same, the result of stimulation becomes constantly less, and the stimulus finally fails to incite a response: the monotony of stimulation raises the threshold. What has been said of the cell applies also to the organism in general: the organism is asleep to a certain environment, when it fails to respond to it. Yet the same organism may be awake to stimuli which have as yet not exhausted themselves. This condition throws considerable light upon dream-life instinctive. It has developed out of the hypnoidal state. "Sleep is an and subconscious activities in general. He concludes that sleep is inactively induced passive state in relation to the external environment.

PAUL KNUTH.

University of Iowa.

T. H. MORGAN: *Chance or Purpose in the Origin and Evolution of Adaptation*. Science, 33: 789, Feb. 11, 1910. Pp. 201-210.

Professor Morgan is dissatisfied with the theory that adaptation is to be explained on the assumption that variations "chance" to find an environment suited to them. He feels that there must be some closer bond that "insures the continuance in a given direction of variations once begun," and he believes that the true explanation is to be sought in the assumed tendency of the germinal material, once it shows itself susceptible of change in an environment, to vary further in the same direction in that environment. In other words, the first accidental adaptation "loads the dice" for further favorable variations. "Each step that the organism has taken guarantees further responses in the same direction \* \* \* The mechanism of survival \* \* \* is such that it insures success where it is most called for."

W. C. B.

C. WARD CRAMPTON. *Education by Play*. Educational Review, 38: 5, December, 1909, 488-492.

Dr. Crampton maintains that play provides the most effective means of developing the virtues that are essential to the social life; and yet, in spite of the efforts that have been made to give the factor of play just recognition in the educational system, we are "threatened with, and have now, a relatively playless, and therefore godless, generation growing up without having virtually learned in any real way justice, courage, and the value of decently and fairly 'fighting hard and square' in the game of life."

Broad and sweeping statements of this sort are very common today in the educational periodicals. We recall having read similar dismal prophecies, urged in justification of almost every reform that has been proposed in education during recent years. We have no quarrel with educational reform in general and we have a very strong sympathy with the playground movement in particular; but men and women who are engaged in educational work and who are putting forth every effort to solve a multitude of most perplexing problems, are becoming impatient of the querulous and fault-finding tone that characterizes so much of our educational literature today. Let us by all means have plenty of playgrounds amply equipped and efficiently supervised, but is it necessary to the attainment of this commendable end that the attention of teachers be constantly directed toward the shortcomings of their present efforts? Is this really the most effective method of insuring efficient service? If it is, let us follow it by all means; but would that some reformer could adopt a more cheerful attitude, just for the sake of the experiment.

W. C. B.

AMERICAN INSTITUTE OF CRIMINAL LAW AND CRIMINOLOGY. *Report of Committee A. A System for Recording Data Concerning Criminals*.

(Chicago; Northwestern University Law Publishing Association Press, December, 1909, Bulletin No. 2, Pp. 16.)

This pamphlet outlines a plan for recording systematically data secured in the investigation of individual criminals. It presents a scheme devised principally by Dr. William Healy, of Chicago, founder of the Juvenile Psychopathic Institute, in conjunction with a board of eight experts in sociology, medicine, psychology, anthropology and related disciplines, and in consultation with numerous experts. The plan has been

successfully used for the last eight months by Dr. Healy, has been recommended for adoption by the judges of the Municipal Court of Chicago, and is now offered for consideration by other workers, who are asked to communicate with Dr. Healy concerning their experiences with such methods of investigation.

The system embraces eight main divisions: (1) family history, (2) developmental history, including antenatal conditions, (3) environment, (4) character, (5) anthropometry, including photography, (6) medical examination, particularly from a neurological and psychiatric standpoint, (7) psychological examination, and (8) psycho-analysis, especially the offender's own narrative.

G. M. W.

G. L. DUPRAT. *La Criminalité dans L'Adolescence*. Paris: Felix Alcan, 1909, Pp. 254. 6 fr.

Discussing causes and remedies the author shows that juvenile crime is on the increase. Both the individual and society are contributing factors; the individual in his desire for license and society in furnishing stimuli for unwholesome reactions. Among the causes of criminality considered are morbid heredity often due to alcoholism, poison or disease; family and social neglect, whereby school education is defective and public opinion contributes little to restraint; immoral education issuing through culpable parents, debauchery and the influence of organized bandits; economic conditions indirectly through the results of the inequalities in industrial and commercial life; and social disintegration through suicide, increase of crime, anarchy and demagogic tendencies. Among the remedies proposed, he emphasizes the need of correction and repression, though criticizing the methods of the penal institutions. He argues for public vigilance in the detection of crime and private enterprise in putting it down. He would provide for such children as are morally abandoned, mistreated and improperly cared for, even over the so-called rights of their parents. He would compel school attendance, provide special education for abnormal children and would provide for all children a means of will training in some serious activity. He would seek to make reforms in public opinion, in the press and in the theatre; and he would set up definite movements against debauchery and prostitution, against family separations and social dissolution.

ROLLAND M. STEWART.

University of Iowa.



GUSTAV MAJOR. *Zur Erkennung jugendlichen Schwachsinn.* Zeitschrift für Experimentelle Pädagogik, 9: 1909, 1-73.

The author maintains that weak-minded children are capable of being taught if the proper methods are employed. But the public school has for its purpose the training of normal children and cannot take care of the feeble-minded. These must be removed to proper institutions. The hope of improvement diminishes with the advance of years. Physically, feeble-mindedness represents arrested development of the entire organism.

The feeble-minded are grouped into three classes, debility, imbecility and idiocy, corresponding to light, medium and severe cases. The leading characteristic of the first class is their ethical defect, that of the last two intellectual defect. A clear distinction is made between mental weakness and mental disease, and likewise between the ethical defect of the feeble-minded and that of normal children. In the case of the feeble-minded, punishment is of little avail for the moral sentiment is impaired. He closes his discussion with an enumeration of the causes of mental weakness, which is valuable for the moral it contains. The author's method for the detection of mental debility is fairly simple and can be applied by the capable parent and teacher.

The author gives a full outline of procedure in diagnosis, the chief tests being (1) mathematical problems; (2) questions involving discrimination; (3) tests of school learning, and (4) various tests by the psycho-analytic method such as association reactions, tests of mental imagery and analysis of stories. He also adds an elaborate outline for medical examination.

PAUL WILHELM KNUTH.

University of Iowa.

## NOTES AND NEWS.

The Association for School Reform has been organized in Germany through the co-operation of the leading educational psychologists of the country. The work is necessarily in the nature of criticism at first, but a very promising constructive program has been announced and it has already been proposed to change the name to "Bund für Erziehung und Schule." (It is most remarkable that we do not have in English any equivalent for the natural meaning of the word "Erziehung;" there is a wide gap between "to raise" and "to educate" which is not adequately filled by "to rear," but it is this unnamed conception which is coming to the front in educational reforms of the day.) The immediate aim of the association is two-fold: the adjustment of the school life, and the development of the child as a whole, mind and body in their various capacities. To this end a strong association has been formed for conferences, encouragement of research, collection and systematization of facts bearing on these issues and for the arousal of public opinion.

A deputation from University College, Reading, England, visited selected institutions in the United States and Canada during May and June. The deputation, which consisted of Mr. Leonard Sutton, Mr. E. D. Mansfield, Principal W. M. Childs and Professor Frederick Keeble, all of the Council of University College, and Mr. R. V. O. Hart-Synnot, Director of the Department of Agriculture and Horticulture of the same institution, was collecting information and will present a report with special reference to the development of professional instruction in agriculture and in education on this side of the water.

*Meumann's Zeitschrift für Experimentelle Pädagogik*, 9: Pp. 241-270, contains an interesting account by the director, Dr. M. C. Schuyten, of his first ten years of work in his now famous Paidological Laboratory at Antwerp. The laboratory was established by the city and the director is given a free hand for practical work in the schools, for study of special cases in the laboratory, and for scientific research according to his own inclinations. The laboratory is equipped with

such psychological and pedagogical apparatus as may be needed, and receives the leading technical journals and books bearing more or less on educational psychology. The situation is unique in the fact that Dr. Schuyten is a chemist and his research centers upon the study of chemical reactions for the purpose of finding out the nature of the fatigue process of the brain. The director, however, reviews current literature and not only aids teachers through conference, but publishes extensively. His bibliography during the past ten years contains fifty-nine titles.

The first meeting of scientists interested in the psycho-analytic method of Freud was held at Salzburg in 1908. A second gathering was held at Nuremberg, March 30-31 of this year, and was attended by some 60 adherents of the Freudian school. Nearly a dozen papers were presented; an international organization was arranged with a central office at Zurich under the presidency of Jung; an international committee was appointed and a monthly bulletin launched to keep members of the association in touch with the development of this interesting movement. In so far as the plans of the organizers of the psycho-analytic method look toward the contribution of new facts and principles bearing upon general psychology as well as upon psychopathology, it is quite possible that our knowledge of mental development in the normal child may be enlarged in a definite and helpful manner by the labors of Freud and his followers.

At the spring meeting of the General Education Board, \$682,450 was voted. Of this sum, \$31,450 was apportioned for the salaries and expenses of special professors of secondary education in the State universities of the South.

"A laboratory for the study of criminals and defectives, according to the general plan advocated by Arthur MacDonald, of Washington, has recently been established in Russia with a relation to the Russian Government to the Government of the United States. Seven hundred and fifty thousand dollars have been appropriated by the Government for the establishment and maintenance of the laboratory. It will be remembered that several years ago Mr. MacDonald proposed the establishment of such a laboratory by the United States Government, the same to be under the jurisdiction of the Department of Justice. A vigorous propaganda in favor of the project was conducted by him, and it received the approval of many scientists and lawyers, but failed of passage. More recently he submitted his scheme to various European governments and its adoption

by the Russian Government is, we believe, the first fruits of his long and persistent efforts in the interest of the scientific study of the criminal classes."—*Journal of Criminal Law and Criminology*.

In *L'Education* for June, 1910, Dr. Henri Schoen gives an account of the recent movement for the teaching of sex hygiene in the German gymnasia. The instruction is given at the end of the course, immediately before the pupils leave the restricted environment of the gymnasium for the greater freedom of the university or of the business world. According to the testimony of teachers in English and American secondary schools it would seem that the information thus gained comes rather too late in the pupil's life to be of the greatest benefit.

The Boston *Record* reports the following: "The new method of medical inspection for schools that the board of health has recently urged upon Mayor Fitzgerald for approval, has not been received by the Mayor with any degree of enthusiasm. The scheme is to get rid of half the 80 physicians who are now receiving \$300 yearly for practically nothing, and have in their places 40 men to draw \$1,000 each. Immediately following the receipt by the Mayor of the new plan of the health officials, scores of physicians who want the new berths began to visit the Mayor's office. Because of the abundance of wire-pulling by the physicians anxious to get among the '40' and the consequent trouble for the Mayor, he has practically decided to maintain the old system for the present." Such a state of things furnishes another argument in support of Superintendent Maxwell's contention that the medical inspection of schools should be under the control of the board of education.

We are glad to call the attention of our readers to Professor Münsterberg's communication regarding *Bascdow's Elementarwerk*, which will be found in another column. Professor Münsterberg writes: "I am so delighted with the book that I should like to spread the interest in it." We hope to give a more detailed review of the work in a later number.

The Berlin Psychological Association is engaged in an interesting and important study of the psychology of the motor individual. An elaborate questionnaire has been worked out, containing 31 questions on the basis of three simple experiments, and the Association desires to secure the detailed introspection of as large a number of adults as possible. The questions are designed to furnish information regarding (1) the motor

element in internal speech, (2) irradiation movements resulting from concentrated attention, such as "thinking aloud," marking the rhythm of music with a slight expulsion of the breath, beating time, following and "controlling" the course of a billiard ball after it is struck, etc., (3) general activity and tendencies to movement (4) expressive movements accompanying musical thought (5) motor accompaniments of the act of thinking the musical scale. Copies of the questionnaire may be obtained of Dr. Richard Baerwald, Halensee-bei-Berlin, Bornimerstr. 17.

In the *Zeitschrift für Psychotherapie und medizinische Psychologie*, Vol. 2, No. 1, Dr. L. Loewenfeld reports a number of cases of surprising recall of childhood memories under hypnosis, memories which for normal consciousness had entirely lapsed. The recall is not immediate, but requires a certain amount of time and effort, and the details develop gradually, growing one out of the other just as in normal memory. Sometimes the action is so much delayed that recall is post-hypnetic rather than under hypnosis. The lighter stages of hypnosis gave the best results. The events recalled go back in some cases as far as the third year of the subject's life. This opens an interesting field for speculation as to the neural activities involved, and raises the question whether in education the parent or teacher may not profitably make use of a kind of hypnoidal suggestion in reviving previous experiences.

Gradually the German universities are waking up to the value of the scientific study of education. We note in the press that Tübingen is to have a professor of pedagogy.

A writer in *L'Education* complains that of all the higher institutions of learning in French-speaking countries only seven give instruction in educational psychology. These are the Musée Pédagogique and the Hautes Etudes in Paris, and the universities of Bordeaux, Lille, Lyon, Genève and Neuchâtel. "Why have not all the faculties their courses in experimental pedagogy? The field is vast enough, and the interest in education is strong enough for all the learned psychologists of our universities to try to contribute something to the progress of this science and for the public to concern itself with it for other than political reasons."

The *Journal of the American Medical Association* states that the University of Pittsburgh will establish in connection with its medical department a laboratory and school for the study of backward children. The scope of the work will include psychologic studies of mental defectives

and delinquents, both children and adults, epileptics and the nervous unfit of all kinds. It will also include work in the university laboratories and the training of nurses and prospective teachers in work of this kind. The work will be under the direction of Professor J. H. White, of the department of psychology, Dr. Edward E. Mayer, of the department of neurology, and Dr. E. Bosworth McCready will be the medical director. The school is to be called the Hospital School for Backward Children.—*Science*.

Here is the *Journal of Education* (London) protesting against too much teaching in the schools. It is all the fault of the Inspector. "The advent of the Inspector in secondary schools, and his advice to the head master to go around the classrooms and see what the masters are doing and how they teach, have resulted in a wide if partially subconscious feeling that one must always be teaching, always giving direct instruction. \* \* \* We need fewer lectures, less direct instruction, and more quiet and thoughtful work on the part of the pupils." What would our German friends think of this?

By a vote of 11 to 10 the congress consisting of twelve undergraduates, twelve alumnae, four faculty members and President Hazard, which was selected to decide the future of the six secret societies of Wellesley College, decided that the societies should be opened to any eligible student on application, without any voting on the part of the societies. It was voted that opportunity for membership in the societies should be limited to three classes of diploma grade students, these grades to consist of those of high academic standing, those showing unusual excellence in any department and those who have given evidence of public spirited service in aid of the college. The latter qualification is to be determined by a committee or organization other than the societies alone. Each society will continue to occupy its own fraternity house.—*The American College*.

The sixth annual meeting of the Southern Society for Philosophy and Psychology will be held at Chattanooga, Tenn., December 27-29, 1910, in conjunction with the meetings of the Southern Educational Association.

According to *Nature* a joint meeting of the Aristotelian Society, the British Psychological Society and the Mind Association, was held in London, June 24 and 25, at which, among other discussions, a symposium on "Instinct and Intelligence" was presented, consisting of papers by Messrs. C. S. Myers, C. Lloyd Morgan, H. Wildon Carr, G. F. Stout and

Wm. McDougall. A paper was also read by Mr. W. H. Winch on "The 'Faculty' Doctrine; an Outline of some Experiments on Children in Relation to this Doctrine."

At a meeting of abnormal psychologists held in Washington, D. C., May 2, 1910, the formal organization was perfected of the American Psychopathological Association. Dr. Morton Prince was elected president for the ensuing year and Dr. G. A. Waterman, secretary and treasurer. The proceedings will be published in the *Journal of Abnormal Psychology*, which was constituted the official organ of the association.

We regret to note the death, at Chocorua, N. H., August 26, 1910, of Dr. William James, emeritus professor of philosophy at Harvard University, for many years director of the work in psychology in that institution. Professor James was generally acknowledged to be the leading American psychologist, and his writings have made his name well known both in this country and in Europe. His influence on the educational thought of the country has been without parallel, and while not closely identified with the modern movement in educational psychology, he has probably done more to familiarize teachers with the fundamental conceptions of psychology than any other man of his generation.

Mr. Edward C. Hegeler, founder of *The Open Court* and president of The Open Court Publishing Company, died at La Salle, Ill., June 4, 1910.

Professor G. F. Arps, of Indiana University, has been appointed assistant professor of psychology in the University of Illinois, taking the place made vacant by the resignation of Dr. J. W. Baird.

Mr. T. L. Kelley, instructor in mathematics at the Georgia School of Technology, has been appointed assistant in psychology in the University of Illinois.

Mr. C. M. McConn, principal of the Academy of the University of Illinois, and supervisor of practice-teaching in the School of Education, has been appointed Registrar of the university, vice W. L. Pillsbury, resigned.

At the University of Missouri Professor W. W. Charters has been made dean of the faculty of the School of Education, Drs. J. H. Coursault and J. D. Elliff have been advanced from assistant professorships to professorships of the history and philosophy of education and of school administration, respectively, and Carter Alexander, fellow in Teachers'

College, Columbia University, has been made assistant professor of educational administration.

Dr. E. P. Frost, instructor in philosophy at Princeton University, has been appointed instructor in psychology at Yale University, to take the place of Dr. Frederic S. Breed, who has been called to the University of Michigan as assistant professor of education.

Professor W. T. Foster has vacated the chair of education at Bodoin College to assume the presidency of the Reed Institute at Portland, Oregon.

Dr. J. E. Wallace Wallin, head of the department of psychology and education, Cleveland Normal Training School, has been appointed director of the laboratory of clinical psychology at the New Jersey State Village for Epileptics, Skillman, N. J. Dr. Wallin has also been designated director of psychological research by the committee on oral hygiene of the National Dental Association. A squad of children suffering from decided oral defects has been segregated for special treatment during half a year or more. A number of standard psychological tests will be carried out at stated intervals, in order to obtain an objective and demonstrable measure of any mental improvements which may result from the restoration of normal oral conditions.

Dr. Bird T. Baldwin has been released from a professorship of school administration at the University of Pittsburg in order to accept a call to the University of Texas, where he will be head of the School of the Science and Practice of Teaching and associate professor of education. His courses will include work in educational psychology and experimental education.

Mr. Milo B. Hillegas, assistant in education, Teachers' College, Columbia University, has been appointed editor of the Bureau of Education, Washington, D. C. He will have charge of all the publications of the bureau.

Dr. C. J. C. Bennett (Ph. D., Columbia), president of the State Normal School, Fairmont, W. Va., has been appointed professor of psychology in the University of Oregon, Eugene, Oregon.

Dr. Stuart H. Rowe, head of the department of psychology and education, Brooklyn Training School for Teachers, has accepted the appointment of principal of the Wadleigh High School, New York City.



PUBLICATIONS RECEIVED TO AUGUST 1, 1910.

EMMET DUNN ANGELL. *Play: Comprising Games for the Kindergarten, Playground, Schoolroom and College.* Boston: Little, Brown and Company, 1910. Pp. 190. \$1.50.

FELIX ARNOLD. *School and Class Management. Vol. II. Administration and Hygiene.* New York: The Macmillan Company, 1910. Pp. xii, 288. \$1.00 net.

W. VAN DYKE BINGHAM. *Studies in Melody.* Psychological Monographs, 12: No. 3, January, 1910. Pp. 88.

GUSTAF BJORKLUND. *Death and Resurrection.* Chicago: The Open Court Publishing Company, 1910. Pp. 205. \$1.00.

MARY WHITON CALKINS. *A First Book in Psychology.* New York: The Macmillan Company, 1910. Pp. xvi, 419. \$1.90 net

JULES COMBARIEU. *Music: Its Laws and Evolution.* New York: D. Appleton and Company, 1910. Pp. 334, \$1.75 net.

JOHN DEWEY. *The Influence of Darwin on Philosophy.* New York: Henry Holt and Company, 1910. Pp. 309.

JUNE E. DOWNEY. *Preliminary Study of Family Resemblance in Handwriting.* University of Wyoming, Department of Psychology, Bulletin No. 1. 1910. Pp. 51.

LYDA B. EARHART. *Teaching Children to Study.* Boston: Houghton Mifflin Company, 1909. Pp. 182. 60c. net.

FREDERIC ERNEST FARRINGTON, PH.D. *French Secondary Schools.* New York: Longmans, Green and Company, 1910. Pp. ix, 450.

THEODOR FRITZSCH, Herausgeber. *J. B. Basedow's Elementarwerk, mit den Kupfertafeln Chodowiecki's u. a.* 3 Bände. Leipzig: Ernst Wiegandt Verlagsbuchhandlung, 1909. Imported by G. E. Stechert & Co., New York. Bd. 1, S. 543; Bd. 2, S. 576; Bd. 3, S. 35 und 96 Kupfertafeln. Halbpergament, Mark 28.

KATE GORDON. *Aesthetics.* New York: Henry Holt and Company, 1909. Pp. 314.

EDWARD C. HEGELER. (Memorial pamphlet.) Chicago: The Open Court Publishing Company, 1910. Pp. ii, 4.

LOGAN DOUGLASS HOWELL. *The Howell Primer.* New York: Hinds, Noble and Eldridge, 1910. Pp. 127. 25c.

G. E. JOHNSON. *What to Do at Recess.* Boston: Ginn and Company, 1910. Pp. vii, 33.

AMY KAHN. *Barnes' First Year Book.* New York: The A. S. Barnes Company, 1910. Pp. 138.

I. L. KANDEL. *The Training of Elementary School Teachers in Germany*. New York: Teachers' College, Columbia University, 1910. Paper \$1.15. Cloth \$1.50.

F. MEAKIN. *Function, Feeling and Conduct*. New York: G. P. Putnam's Sons, 1910. Pp. xviii, 276. \$1.50 net.

ANNE M. NICHOLSON. *The Concept Standard*. New York: Teachers' College, Columbia University, 1910. Pp. 138. Paper \$1.15. Cloth \$1.50.

W. B. PILLSBURY. *The Psychology of Reasoning*. New York: D. Appleton and Company, 1910. Pp. 306. \$1.50 net.

*Psychotherapeutics: A Symposium by MORTON PRINCE and eight others*. Boston: The Gorham Press, Richard G. Badger, 1910. Pp. 204. \$1.50 net.

FLORENCE RICHARDSON. *A Study of Sensory Control in the Rat*. Psychological Monographs, 12: No. 1, October, 1909. Pp. 124. \$1.25.

SANTE DE SANCTIS. *Infantilismo e mentalità infantile*. Reprinted from *Rivista Italiana di Neuropatologia, Psichiatria ed Elettroterapia*, Vol. III, No. 2.

SANTE DE SANCTIS E LANFRANCO CIAMPI. *Rendiconto delle malattie trattate nella casa di cura e di educatione per fanciulli nervosi*. Orvieto: Marsilio Marsili, 1909. Pp. 67.

PETER SANDIFORD. *The Training of Teachers in England and Wales*. New York: Teachers' College, Columbia University, 1910. Pp. 168. Paper \$1.15. Cloth \$1.50.

ARLEY BARTHLOW SHOW. *The Movement for Reform in the Teaching of Religion in the Public Schools of Saxony*. Washington: Government Printing Office, 1910. Pp. 45.

ALVA WALKER STAMPER. *A History of the Teaching of Elementary Geometry*. New York: Teachers' College, Columbia University, 1909. Pp. 163. Paper \$1.15. Cloth \$1.50.

CLIFF WINFIELD STONE. *Arithmetical Abilities and Some Factors Determining Them*. New York: Teachers' College, Columbia University, 1908. Pp. 101.

JAMES P. WARBASSE. *The Conquest of Disease through Animal Experimentation*. New York: D. Appleton and Company, 1910. Pp. xiii, 176.

MARY S. WOOLMAN. *The Making of a Trade School*. Boston: Whitcomb and Barrows, 1910. Pp. iv, 101. 50c.

## THE BINET SCALE FOR MEASURING INTELLIGENCE AND RETARDATION.

EDMUND B. HUEY, PH.D.,

*Director of the Department of Clinical Psychology, Lincoln State School and Colony, Lincoln, Illinois.*

The French government has recently provided for the establishment of special classes for mental defectives in the schools of France. It is necessary to have some definite means of determining who are defective. After years of preliminary testing, Professor Binet has completed a scale of tests designed to meet this need. It was worked out with the assistance of Dr. Simon of the St. Anne Hospital in Paris, and has been described in a long article by Binet and Simon, in *L'Année Psychologique* for 1908.

It seems to be generally conceded, and I think correctly, that we have in this scale the most practical and promising means yet made available for determining the fact and for measuring the amount of mental retardation. Other sets of tests, such as those of Burt in the December, 1909, number of the *British Journal of Psychology*, and many others published from time to time in various journals, give us tests and results which in some cases may be taken as standards; but only for some given age, and perhaps for some special social station at the given age. Usually, too, they demand more apparatus than is necessary, and are not as quickly and simply applicable as such tests must be for extended work in the public schools. In the Binet scale, norms have been determined for *each* age from three to thirteen inclusive, and the tests and apparatus have been so simplified that the testing psychologist may carry everything

needed in a very small hand case, and may test a pupil and make the necessary record in from twenty minutes to an hour and a half.

This scale of tests is in constant use and is a great convenience in the work of the New Jersey institution for the feeble-minded at Vineland, and in that of the Illinois institution at Lincoln. These institutions, however, are concerned to know whether these norms found for the successive ages of French children are really norms which hold good for the same ages of American children. Besides, and Binet himself calls attention to this, the Binet norms have been worked out for children of the working classes of Paris and vicinity. They may need some revision when applied to other social classes and to other regions, even in France.

I have not seen any published results of trials with this scale in America. The present article is written to call the attention of psychologists and educators to the fact that we have here an immediately available means of measuring retardation which can be of immediate and extensive use in the schools and institutions of America. It needs to be tried out, extended if possible beyond the age of thirteen, and revised wherever revision is certainly indicated. Additional tests can be added for any given age, as we find that children of that age come to be able to do certain mentally significant things with established degrees of perfection. Psychologists may thus incorporate in the scale such other norms as they have established or find to be established for given ages. What I would urge especially is first that we have here the most usable ready-made scale, and second that we have, in it, the right "idea" for the construction of a still better scale.

What are the tests and how are they to be used? I present here the complete series, stating each test as simply and briefly as possible, for the most part in the form of record used for reference in the files of this institution. The tests for one and two years are numbered in a separate series, as

they are not a part of the 1908 scale, but were published in L'Année for 1905, as norms for these ages. These 1905 tests are here arranged in an ascending scale of difficulty from one to six.

#### FORM OF RECORD FOR THE BINET SCALE.

Mental examination of.....Age.....  
 Examined.....by.....Grade.....Passed.....  
 tests of.....expected at this age. According to these tests, child's  
 intelligence is approximately at the level of.....years of age, indicating  
 a retardation of.....years. Syllabus used.....Con-  
 ditions.....

#### *Mentality of one and two years.*

1. Eye follows light.
2. Block is grasped and handled, when placed in the hand.
3. Suspended spool is grasped when seen.
4. Candy is chosen instead of block.
5. Paper is removed from candy before eating, child having seen the wrapping.
6. Child obeys simple commands, and imitates simple movements.

#### *Mentality of three years.*

1. Touches nose, eyes, mouth, and pictures of these, as directed.
2. Repeats easy sentences of six syllables, with no error.
3. Repeats two numerals.
4. Enumerates familiar objects in pictures.
5. Gives family name.

#### *Mentality of four years.*

6. Knows own sex.
7. Names key, penny, knife.
8. Repeats three numerals in order, when heard once.
9. Tells which is longer, of lines differing by a centimeter.

#### *Mentality of five years.*

10. Discriminates weights of 3 and 12 grams, 6 and 15 grams.
11. Draws, after copy, a square that can be recognized as such.
12. Rearranges a rectangular card that has been cut diagonally into two triangles.
13. Counts four pennies.

#### *Mentality of six years.*

14. Shows right hand, left ear.
15. Repeats easy sentences of 16 syllables.

16. Distinguishes pretty from distinctly ugly or deformed faces, in pictures.
17. Defines, in terms of use, the words ~~fork~~, table, chair, horse, mamma, three satisfactorily
18. Performs three commissions given simultaneously.
19. Knows own age.
20. Knows whether it is forenoon or afternoon.

*Mentality of seven years.*

21. Notes omission of eyes, nose, mouth, or arms, from as many portraits.
22. States number of fingers on right hand, left hand, both hands, without counting.
23. Copies written phrase, with pen, so that it can be read.
24. Draws diamond shape, from copy, so that it can be recognized.
25. Repeats five numerals in order, when pronounced once at half-second intervals.
26. Describes pictures shown in No. 4.
27. Counts thirteen pennies.
28. Names penny, nickel, dime, silver dollar.

*Mentality of eight years.*

29. Reproduces correctly two facts, after once reading 7 lines about a fire.
30. Counts values of six stamps, three ones and three twos, in less than 15 seconds.
31. Names red, green, blue, yellow.
32. Counts from 20 to 0 in 20 seconds, with not more than one error.
33. Copies easy dictation, so that it can be read.
34. States differences between paper and cloth, butterfly and fly, wood and glass, in 2 minutes, two satisfactorily.

*Mentality of nine years.*

35. Names the day and date.
36. Names days of week in order, in ten seconds.
37. Gives correct change from a quarter paid for an article costing four cents.
38. Defines in terms superior to statements of use, in No. 17.
39. Reproduces six facts from 7 lines read once, in No. 29.
40. Arranges, in order of weight, boxes of same size and appearance weighing 6, 9, 12, 15, and 18 grams, in three minutes, two out of three trials.

*Mentality of ten years.*

41. Names the months in order, allowing one omission or inversion, in 15 seconds.
42. Names a penny, nickel, dime, quarter, half, dollar, two, five, and ten-dollar bills, in 40 seconds.
43. Uses three given words in not more than two sentences.
44. Tells what one should do if misses train, if unintentionally struck by playmate, or if breaks an object belonging to others. Two satisfactorily.

45. Tells what should do if late for school, or before undertaking an important affair, and why we should judge by acts rather than by words. (Two other questions may be asked.)

*Mentality of eleven years.*

46. Detects incongruities in 3 out of 5 statements, in about two minutes.  
 47. Uses three given words in one sentence.  
 48. Names at least 60 words in three minutes.  
 49. Defines charity, justice, goodness, two satisfactorily.  
 50. Rearranges shuffled words of 8-word sentences, two out of three, with one minute for each.

*Mentality of twelve years.*

51. Repeats seven numerals in order, when heard once.  
 52. Names three words that rhyme with obey, in one minute.  
 53. Repeats, with no error, sentence of twenty-six syllables.  
 54. Infers a fact from given circumstances which indicate the fact.

*Mentality of thirteen years.*

55. Images and draws result of cutting triangle from side of twice folded paper.  
 56. Images and draws new form produced by joining transposed pieces of diagonally divided visiting card.  
 57. Distinguishes between abstract terms of similar sound or meaning.

No descriptive notes and directions which can be given in any brief compass can take the place of a careful reading of Binet's article in *L'Annee Psychologique* for 1908. After such a reading, the following supplementary notes, bearing the numbers of the tests to which they correspond, may give sufficient guidance for making the tests which are not self-explanatory.

No. 6, (1905 series). 1. Shake hands. 2. Be seated. 3. Pick up the box. 4. Go to that chair. 5. Come back. (a) Clap hands this way. (b) Hands in air; (c) on shoulders; (d) behind back; (e) one hand around the other. (f) Rise on toes.

Nos. 3, 8, 25, 51. Half-second intervals, uniform emphasis, one success in three trials.

Nos. 4 and 26. But one test is made, by presenting in succession three pictures, asking for each, "What is this," and noting replies. Binet's pictures are (1) An old man and boy dragging up the street a cart laden with their household goods; (2) A poor old man sitting by his daughter, who is unwell, on a bench beside the street on a dreary evening;

(3) A man confined in a room bare except for bed, chair, and tables, and looking out of his tiny window.

No. 6. "Are you a little boy or little girl?"

No. 10. Weights are of same size and appearance.

No. 12. Place the pieces with the hypotenuses away from each other. Child must discover for himself that he has the right form.

Nos. 13, 27. Child touches each penny as counted, tallying correctly.

No. 15. "We will go out for a long walk. Please give me that pretty straw hat." Construct similar sentences.

Nos. 17, 38. One test for the two numbers. Answers which pass 38 are such as "A horse is an animal that pulls a wagon," "A mamma is a lady who takes care of the house, cares for the children," etc.,—almost any response, indeed, which is of higher order than the simple "A chair is to sit on," "A table is to eat on," etc., of No. 17 grade. Three of the five must be satisfactory.

No. 18. "Put this key on the table, then close the door, then bring me that box," or a similar series of directions.

Nos. 29, 39. We have the child read aloud the following: "Lincoln, April 30. A terrible fire in Springfield destroyed, last night, three large houses in the center of the city.

Seventeen families are without homes. The loss is more than \$30,000.

In saving a baby from its cradle, a barber's boy was badly burned on the hands."

The count is made on the basis of about 19 details, at least two or six of which must be correctly given. Ordinarily the reading in 39 should not occupy more than a minute.

No. 33. Ask child to write "The pretty little girls."

No. 35. Allow three days' error either way, as to day of month.

No. 37. Play store, give child some change, have him sell a box and actually hand over the correct change for the quarter.



Nos. 43, 47. Words fairly equivalent to Binet's, for our children, are "Chicago, fortune, and river," with preliminary practice on the easier "Springfield, money, and boy." Must be completed in about one minute.

No. 45. Ask also: (a) "What ought you to do when asked your opinion of some one whom you know only a little?" (b) "Why should you pardon a misdeed done in anger more readily than one done without anger?" Replies should be satisfactory for at least three of the five, and at least twenty seconds should be given for reflection on each question.

No. 46. Announce that you will read some sentences, each of which contains something foolish. Then read slowly, in a convinced tone: (1) A poor bicyclist fell and broke his head, and died on the spot. He was taken to the hospital, and they are much afraid that he cannot recover. (2) I have three brothers, Paul, Ernest, and myself. (3) Yesterday the body of a poor young girl was found, cut in eighteen pieces. People think that she killed herself. (4) There was a railroad accident yesterday, but it was not serious. The number of dead is only forty-eight. (5) A man said, "If I ever kill myself, it won't be on a Friday; for Friday is an unlucky day, that would bring me misfortune."

After each number, ask what is foolish in it. The whole test lasts about two minutes, and replies must be satisfactory for three of the five numbers.

No. 48. Child is asked to say all the words he can think of, such as table, beard, shirt, go, etc.

No. 49. Ask "What is goodness," etc. Such answers as "Goodness is to share with others," "to return good for evil;" "Charity is to give money to old people who cannot work," are satisfactory.

No. 50. Make a sentence of these words:

(1) For—The—Started—An—  
We—Country—Early—At—Hour.

(2) To—Asked—Exercise—My—  
Teacher—Correct—My—I.

(3) A—Defends—Dog—Good—  
His—Bravely—Master.

No. 52. First illustrate rhyming, by examples.

No. 53. (1) My little children, you must work very hard for a living. You must go every morning to your school. (2) The other day I saw in the street a pretty yellow dog. Little Maurice has got spots on his new apron. (3) Ernest is often punished for his bad conduct. I bought at the store a pretty doll for my little sister.

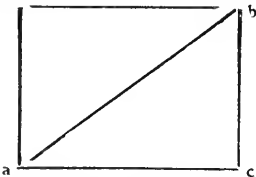
In Nos. 2, 15, and 53, the correct repetition of one sentence in three suffices.

No. 54. (a) "A man who was walking in the woods near Chicago suddenly stopped, very much frightened, and then ran to the nearest police station to tell them that he had just seen, fastened to the limb of a tree, a . . . . .?" (b) "My neighbor has just received some peculiar visits. There came, one after the other, a doctor, a lawyer, and a minister (or priest). What is going on at my neighbor's?"

Such answers as (a) "A dead person hanging," and (b) "My neighbor is dying," are given, and both numbers must be answered satisfactorily. Doubtless this test can be improved.

No. 55. Fold a square paper in four, before the child, and cut from it a small equilateral triangle based on the middle of the closed edge. Ask to draw paper as it will look when unfolded.

No. 56. Present a visiting card cut in two along a b. Suppose we should turn over the lower triangle so that c should lie at b and a c should lie along a b. Remove the lower piece and have child image and draw the new total shape suggested, beginning with the upper piece.



No. 57. What are the differences between—

- (1) pleasure and welfare?
- (2) evolution and revolution?
- (3) event and prevent?

(4) poverty and misery?

(5) pride and pretension?

Opposite the statement of each test in the record, we place a plus sign for passed, a minus for failed, an exclamation point for absurd response, A for failure through inattention, T for failure through timidity, R for failure through resistance, I for failure through ignorance. In rare cases partial credit is given, expressed in a fraction. The testing should begin a little below the child's apparent level. Indeed, I usually try all the tests that I am not certain of the child's passing, and the testing should continue until there is no possibility of his going further. He should be encouraged and praised whenever possible, and failures should never be dwelt upon. In making the count the child is credited with the age level at which he passes all the tests, or all but one. To this is added one year for each five tests passed at higher levels. We record also the total number of 1908 tests that are passed, with the number that *should* be passed at the child's age. We have found it convenient to use half years, that is, the child's age may be  $10\frac{1}{2}$  and his mental level  $8\frac{1}{2}$ . In the Binet classification, retarded children who cannot pass beyond the tests for two years are classed as idiots. Above this but below the eight-year level they are imbeciles. Children passing tests for eight years or higher are classed as feeble-minded, using the term in a restricted sense for the higher grade defectives. The terms "backward" (or "retarded") and "unstable" may be used for the two main transition classes between the feeble-minded and the normal.

Usually it is far better to be alone with the child, and in any case the test must not be discussed or in any way interfered with. Many of the child's responses should be copied verbatim, and notes should be made of his conduct shown in the various circumstances of the testing.

It is to be noted that my translations have often been very free, and that a few necessary changes have been made in adaptation to American conditions. I do not believe, how-

ever, that comparative values in the scale have been essentially changed by such restatement, and Binet's own forms are used wherever possible.

In conclusion, I would urge that these Binet tests must be used with judgment and trained intelligence, or they will certainly bring themselves and their authors into undeserved disrepute. Such a syllabus as is here presented by no means prepares mothers and teachers to make any valid test either of their children or of the scale. A child will often be shown to have the knowledge needed in a test in which he failed, and the test will then be called inadequate. But the test is not of knowledge merely, but of the ability to use knowledge in meeting a situation created by the standardized conditions of the test. Results can be considered valid only when the tests are made by an experienced psychologist who has familiarized himself with Binet's directions, or by other competent persons who apply the tests under the direction and supervision of such a psychologist.

If the tests are to be used in determining who are to be placed in special classes, the little book *Les Enfants Anormaux*, by Binet and Simon, will be found extremely valuable. According to this French plan, a pedagogical examination must first show a pedagogical retardation of three years, or of two years if the child is under nine. Then the mental tests are used, and only the backward children who show an equal amount of *mental* retardation are sent to the special classes. It is to be noted, however, that beside the children whose main characteristic is their mental "backwardness," Binet would send to special classes the "un-stables," who are apt to show a mental retardation of only one or two years.

It is to be hoped that we may have early, though of course not premature, publication of a try-out of the Binet scale upon normal American school children.

Note. Professor Binet has recently been so good as to inform me that certain modifications have been made in this scale, and that these will be published in *L'Année Psychologique* for 1911.

# THE RATIONALE OF PROMOTION AND ELIMINATION OF WASTE IN THE ELEMENTARY AND SECONDARY SCHOOLS.

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It does not require a very observant student of matters educational to notice that a new demand upon American teachers is rapidly gaining momentum: the demand to keep children constantly moving from grade to grade. The educational atmosphere is vibrant with the demand that there shall be no hold-overs, no non-promoted pupils, to clog the educational machine and to render the movement stagnant and abortive. Promote! Promote everybody, the delinquent as well as the efficient! is the slogan.

This unremitting demand for wholesale promotion rests upon certain very obvious considerations. (1) There is the desire on the part of school officers and authorities—boards of education, superintendents, principals, and mayhap also classroom teachers—to make a creditable showing at the end of the academic year. A large record of failed pupils is a reflection upon the efficiency of the school system, for the efficiency of the system varies inversely, it is argued, as the number of non-promotions. As long as it is considered that the efficiency of the school system is adequately measured by the per cent. of promotions, it is but human nature that officials having the administration of schools in charge should clamor for high “returns” in the form of abundant promotions. With this demand dinned into her ears the classroom teacher cannot fail to grow restless. If her professional efficiency can be measured objectively by the criterion of per cent. of pupils

promoted, it is quite natural that she too should second the demand for wholesale promotion. This first demand springs then from considerations of business.

(2) That parents desire that their children be regularly and constantly promoted goes without saying. So far as a very large number of parents is concerned, the question of merit is quite negligible. They ask that their child be passed along with his class irrespective of whether he has won his spurs by application or by ability. With them it is a question of getting the child released from his enforced tutelage at the earliest moment sanctioned by law. This demand rests on grounds of sentiment, pride, and economy.

(3) Non-promotion results in congesting the lower grades. They become over-large in consequence of the new accessions and the retention of the laggards, since the latter cannot withdraw in view of the compulsory attendance statutes. The result is a serious clogging of the system and an impairment of educational efficiency at the time when the child is in the most helpless condition and when he requires the maximum of attention. The system thus deteriorates near its very foundation where it should be most securely buttressed. Moreover, to handle adequately the congestion in the lower grades necessitates increasing the size of the classes beyond an efficient working unit, or augmenting the teaching force in these grades. The system thus becomes "bottom heavy." These evils would be remedied by wholesale promotion. For a case in point, witness the results of a more liberal policy of promotion in Milwaukee. Six years ago there were 50% more children in the first grade than now (computed upon the basis of an attendance of 1000); 25% more then than now in the second grade; while in the fifth grade there is now an *increase* of 10%; in the sixth, 20%; in the seventh, nearly 50%; in the eighth, 50%; and in the high school, 50%. Had the policy of six years ago obtained to-day 1914 children would have been repeaters in the first year and lost at least a whole year in their march through the grades, while 1194 would not have

reached the seventh grade six years ago. Stating the facts in terms of the age of the pupil, we find that the age has been lowered for each grade, amounting to six months in the first grade and nearly three in the second. What is perhaps most astonishing: parallel with the increased attendance there has been a reduction in the number of pupils per teacher amounting to about 20%, owing to the more even distribution. (These results are culled from a current periodical.) Here we have a demand for promotion based upon educational and business economy and structural symmetry in the educational organism.

(4) It is desirable to keep children in school as long as possible. A democracy must look to the trained intelligence and character of its average citizenship for the bulwark of its perpetuity. It must demand that the schools retain the child till he has a fair degree of command of the basal instruments of personal and social control. This demand cannot be adequately met unless the child can be supplied with the richer and more significant experiences of the upper grades. Now, as is well known, non-promotion is a fruitful cause of early withdrawal from school. The non-promoted pupil tires of the struggle, learns to despise the school, plays truant, and drops out as soon as he is safe from the clutches of the law. The figures cited above show strikingly, on the other hand, the effect of promotion upon school attendance. In the upper grammar grades and the high schools the increase amounted to 50%, or 75% for the high schools if only the last four years are considered. Owing to the reduction in the average age of the pupils many were thereby compelled, under the law, to enter high school. In promotion we find, then, a remedy for early elimination. To people the upper grades, keep the pupils moving. This demand rests its case upon the right of the state to look to the schools, its own creation and handmaid, for the adequate preparation of that intelligent, wise and moral leadership which is needed for the progressive differentiation and integration of its social forces,

and for the guidance of the ship of state along those channels which have been charted and successfully explored in the past. The mere failure to make a certain 'grade' in intellectual attainment cannot be considered an insurmountable bar against efficiency in such leadership, and, as it is contended, should therefore not constitute a bar against school progress.

(5) Finally the advocate of a liberal policy of promotion rests his case upon the rights of the child. Brought into the world without a voice in the matter, he is marshaled into the schools without option or redress. Born into the world with individual traits and characteristics, he is immediately placed in an educational straight-jacket and lock-step to which he is not by nature adapted and to which he cannot become adapted by nurture. Differing greatly among themselves in aptitudes, capacities and abilities, all the children are yet made to conform to the same requirements. They must hit the same gait, keep in step with the procession, solve the same problems, adjust themselves to the same routine, or fall along the way side. The child is for the machine and not the machine for the child. He must conform to its workings or be crushed by its ponderous machinery; this is the inexorable law of the survival of the fittest in the world of nurture. Conformity or extinction! But what right, so it is argued, has the system or the classroom teacher to sit in judgment upon the child's intellectual salvation? What right has the teacher to set up an arbitrary standard of excellence in classroom efficiency and prejudge the child's future success in life by this same arbitrary standard? What guarantee is there that classroom delinquency spells failure in the marketplace, in the counting room, in the pulpit, or at the bench? Whence the infallibility of the teacher's labels, her E., G., F., and P., so far as efficiency in the vital pursuits of the workaday world is concerned? Does 'school-inspected' in the case of children have any more value than 'government-inspected' in the case of cattle or hogs? Was not Byron al-



ways at the foot of his class? Napoleon Bonaparte forty-second? Emerson so poor in mathematics that he was dubbed a dunce? Curie so stupid that he required a private tutor? Lowell suspended because of his negligence? Swift refused graduation because he failed in two out of three subjects? Linnaeus so dull that he was advised to become a cobbler? Webster a dullard in Greek and mathematics? What teacher will attempt to prejudge a child's future usefulness to society by the results of classroom tests? This demand, then, finds its justification in the inalienable right of the child to receive the best training for which he is by nature fitted to profit, regardless of the arbitrary standards of the school or of the standards of attainment set by his fellows.

Whether or not we are ready to subscribe to all these arguments for a more liberal attitude toward the question of promotion, the above presentment is sufficiently cogent to merit serious consideration. There can be no doubt, to my mind, that there has been a considerable 'letting down of the bars' in certain quarters during the last decade. Whether the movement is a healthy one is not so obvious. On one proposition we can stand together, as it seems to me: promotion should involve the maximum number of pupils possible and not the minimum. We should strive to promote as *many* and not as *few* as possible. How to achieve this result is quite another question. Granting the proposition we have laid down, the method by which it is to be accomplished is debatable ground. Here we may expect to find wide differences of opinion. Let us examine some of the possible solutions.

(1) Move the child along whether he passes or fails, irrespective of his merits. Make the criterion of promotion the *amount of time spent* on a subject, rather than the degree of efficiency attained. I have heard this advocated from the rostrum only once, but it obtains, no doubt, in practice in more schools than one would suspect. I was once connected with a school in which it had been almost a settled policy to

admit practically anybody and to pass practically everybody.

This measure is unprofessional, insincere, illegal, disruptive of the school organism, and destructive of the teacher's self-respect as well as of his respect for the profession of which he is a devoted member. Where a certain standard of efficiency for passing has been established by enactment, it is unlawful to disregard it in practice; and passing grades are well-nigh universal. There is no legal way of circumventing them except through a repealing act. But it is little likely that they will be abolished. Their repeal would spell educational calamity. The most sacred possessions in the professions are their *ideals*, the patterns of excellence to which the true craftsman cheerfully subscribes and loyally adheres. To deprive teaching of a *standard* by which to evaluate the efficiency of its results would be as disastrous as to abolish the moral, social and civic ideals by which the conduct of the citizens of a country are rightly judged. The result in the latter case would be national and social decay; in the first instance it would lead to intellectual stagnation. It would make the profession of teaching face backward, instead of forward, and would make it a laughing stock among the other professions. The tendency in all the other professions is to raise their requirements and ideals. Teaching cannot afford to be an exception. Nor would teaching remain an isolated exception, for to degrade the teaching profession would be to degrade the other dependent professions. Their efficiency depends on the prior efficiency of teaching. There would be no escape here from the operation of the law of interaction. Nor would the nation at large, with its unbounded enthusiasm for educational uplift, tolerate very long a retrograde movement in education. No teacher can long remain in a profession with such elusive standards, and maintain a healthy respect for her work. Manifestly to require her to promote delinquent children in open defiance of the passing standard is not only dishonorable but tantamount to asking her to forfeit her self-respect.

This remedy is impractical and impossible; it is a pedagogical heresy that would be unworthy even of passing notice, were it not that this doctrine obtains in practice in certain schools in this day and generation—more's the pity! Lack of *elasticity* in promotion requirements is unjust; but lack of any standard at all is fatal.

(2) Instead it would be possible to authorize greater latitude in the matter of promotion by *reducing the passing limit* all round, say, to 60% or 65%, instead of the traditional 70 or 75%. This elastic standard would make it possible to reach any delinquent pupil worthy of promotion. Such concession would be justifiable even if it only resulted in keeping the pupils in school a year or two longer.

This plan would be perfectly feasible and legitimate. It involves a danger, however, in the fact that many children aim to expend only sufficient effort to make passing grades. The plan might thus result in the lessening of application, in the "scampering" of work on the part of such pupils, and in a general degradation of the standards. With such a scheme it would be possible, of course, to set a higher standard for the high school, or the two final years of the high school. But there is the possibility in the latter case that these upper classes would be flooded with students too weak to keep pace with the procession. This is already clearly the situation, as it appears from the latest computations of the per cent. of children failing in the different grades, based upon the reports from twenty-eight cities. From these it appears that the per cent. of failures in the 2d grade is 12.25%; in the 3d, 14; in the 4th, 14.75; in the 5th, 16; in the 6th, 14.25; in the 7th, 15; in the 8th, 12.5; in the first High, 21; in the 2d High, 20; in the 3d High, 16, and in the 4th High, 5%.<sup>1</sup> The greatest mortality is in the first two years of the High School.

<sup>1</sup>THORNDIKE. *Promotion, Retardation, and Elimination*. Psychological Clinic, 1910, p. 232f.

(3) A similar plan is to *adjust the pace of the teaching* to the capacities of the 'submerged tenth,' while retaining the usual passing standard. Lower the standard of the *instruction*; bring it down to the level of the weak children; strip everything of its difficulties and technicalities or pass over the difficult subject matter.

This would make a sorry trade of teaching. It would degrade a high calling by making it impossible for its craftsmen to work at their highest level of attainment. It would subordinate the interests of the most hopeful and brightest children to the demands of the weaklings; against this procedure the former would justly rebel. This solution would be discriminatory and unjust. In mass instruction the interests of the *majority* must ever remain paramount; the requirements must be pitched at a point which demands work at the highest level of attainment, so that the 'greatest good may be done to the greatest number.' It is morally indefensible to lower the grade of the work for the many in the interests of a few laggards, or to neglect the many in order to concentrate on the under-grade pupils that they may be brought up to standing.

(4) Accordingly we are justified in segregating the scholastic delinquents in rooms by themselves and providing them with specially trained teachers. This is now the almost universal practice so far as concerns the idiotic, imbecile and markedly retarded. This practice is destined to get a wider application. The atypical or merely backward children in all city systems will soon be segregated in rooms or schools by themselves. There were in 1907, 204 of these "auxiliary" school in Prussia, with an aggregate attendance of 12,734, or an average of 18.5 pupils per teacher. In America the first special room for the retarded and subnormal was established in Cleveland in 1875. These "special" or "defective" rooms are now found as integral parts of the system in Providence (1894), Springfield, Boston, Philadelphia, Chicago. New York, etc. During the last academic year a

unique experiment was tried in Cleveland. An elementary industrial school was instituted in connection with one of the grade schools (Brownell) for retarded pupils from all parts of the city in the sixth and seventh grades. It is now attended by about 150 boys and girls, five-eighths being boys. The school day consists of nine 45-minute periods. One is devoted to lunch and recreation, three to academic work in mathematics, English and geography, one for study, and the four remaining periods are given to hand occupations leading to some specialized vocation. There is also provision for gymnastics and music. Next fall another experimental school will be organized. A whole building (Longwood), will be reserved for a simplified course of study, in which certain academic, domestic and industrial branches will be emphasized. It will be a school with a strong vocational bias. In admitting pupils to this school preference will be given to pupils in the nearby district in grades three to six inclusive who are old for their grade or retarded. This school will drain a district containing over 10,000 school children, over one-third of whom it was recently found were retarded, 1,484 one year, 971 two years and 777 three and four years. This is one of the first efforts on a large organized scale to eliminate the waste incident to retardation by organizing a special school for over-age pupils.

This is a perfectly feasible remedy, and an effective one. The backward child is prone to rebel against school life either because he does not get enough aid in the regular classes to enable him to progress, or because he is taunted constantly by the attitude and remarks of his more fortunate and abler brothers which serve to remind him of his inferiority. In the segregated room or school he will find a congenial atmosphere among pupils of his own mental calibre and a course of study better arranged to meet his needs. The larger school systems are unmistakably coming to this; the backward pupil will receive more sympathy and intelligent care hereafter. Every large system will soon employ

a clinical psychologist whose work will be to determine the mental age of all exceptional children, make a clinical study of their mental peculiarities, diagnose, prescribe the indicated pedagogical treatment, and place them properly either in the public schools or in appropriate institutions. For our cities to fail to utilize this specific is as pitiless as it is uneconomical.

(5) The medical, dental and hygienic inspection and supervision of all the children of the schools, and the removal of the physical handicaps which produce mental retardation and moral delinquency, are measures which make for increased attendance, promotion and efficiency. The dullness and delinquency of many children are due almost entirely to the presence of various physical defects—adenoids, enlarged tonsils, obstructed breathing, impaired vision and hearing, etc. Physical defects of this nature should be remedied as a matter of ordinary school routine under the law. The legality of such a procedure may be open to question and the whole matter is yet in the experimental stage; but it would seem that if it is legal to compel a child to attend school till he reaches a given age, it must be lawful, by a parity of reasoning, to require the constituted authorities so to equip and environ the child that he may be able to profit in maximal degree from the opportunities afforded him at public expense. To take any other view is to confess that the state possesses the power to tax itself as it sees fit for the public good, but that it is impotent to make the levy maximally effective. That this is not the point of view of current practice appears from the fact that children suffering from contagious and communicable diseases are now almost everywhere rigorously excluded from the privileges of the schools, and that certain states now permit or require the destruction of the procreative functions of imbeciles and feeble-minded persons as a matter of self defense. Since it thus appears to be legal to *destroy* certain vital functions, it must be legal to *treat* certain ailments and *operate* upon

certain physical defects which handicap the individual child and consequently obstruct the machinery of the schools—a procedure which not only does not involve the abrogation of any functions but the *restoration* of functions to normal working. The radical objections to the treatment of pupils suffering from diseases or defects which lessen their classroom efficiency, as a matter of the routine work of the schools, are not legal, but political and vocational. It smacks of socialism and communism; and it is a menace to the medical practitioners who would find it impossible to gain a livelihood with free medical treatment of school children. Eventually we shall hit upon some compromise scheme; our school moneys cannot be economically spent until that is done.

To show how important these measures are as a means of effectively solving the problem of irregular attendance (which is chiefly caused by ill health, which is the chief cause of non-promotion, if the contention of Ayres is to be credited) I may reproduce the statistics from one of the volunteer medical stations which has been conducted in Cleveland during the last two years. At this station the pupils have been examined by the medical examiner in charge, simple infections and ordinary ailments have been treated by the nurse, shower baths have been given, and the pupils and parents have been instructed by the nurse how to remedy the trouble. According to the computation of the Principal, Miss O'Neil, the school nurse and the school dispensary saved 1,871 days for the school and for the child in six months, or about ten years in the aggregate. Pupils who would have been excluded from the schools from five to ten days owing to the presence of infections, pediculosis, impetigo, scabies, etc., received such care at the school that they could remain at school without any danger of infecting the others and without the need of getting behind in their work. In addition 283 non-communicable ailments were cared for during the same time, which increased the working efficiency of the pupils concerned. The economic loss to the taxpayer that was

obviated through this work makes an enormous total. The direct gain to the suffering child is inestimable.

(6) By reducing the size of the classroom mass or unit more individual attention can be given by the teacher to the pupils. This should make for better preparation and increased promotion. That a recent study<sup>2</sup> seems to indicate the contrary—that small classes have no advantage—may be due to the fact that when classes are large it is impossible to “get around” very often to each pupil. This offers more chances for “bluffing.” The pupil’s work must be judged upon the basis of a few recitations or memory tests, and will thus be taken largely on faith. With smaller classes it is possible to keep in constant touch with each pupil; this lessens his chances of slipping through. Thus while he may appear to be doing poorer work, he is really receiving better training. This matter requires further working over.

(7) The schemes of semi-annual and quarterly promotions, and of the various group systems of instruction, which are now on trial in various cities of the country, also offer valuable suggestions. Pupils and parents will feel less disheartened over a half year’s failure than over a whole year’s delinquency. Both expedients have already been explicitly adopted with a view to increasing the per cent. of promotions.<sup>3</sup> The results of these efforts will be followed with interest by schoolmen and parents.

(8) Another scheme is to disregard certain branches in computing the child’s record for promotion, in order to make allowance for the individual differences which exist in children’s capacities and capabilities. What branches should be disregarded in any given case would depend upon the ‘individual equation,’ the idiosyncrasies of the given child. This is probably so in theory; but in practice the branches which would be most frequently disregarded in the rating would, presumably, be those which cause the greatest slaughter.

<sup>2</sup>CORNMAN. *Size of Classes and School Progress*. Psychological Clinic, 1910. p. 260.

<sup>3</sup>Cf. JONES. *Teaching Children to Study*. New York, 1909



These branches in the Cleveland schools appear to be arithmetic and grammar in the elementary grades, and Latin algebra, and geometry in the high schools.

This solution is not practical, it seems to me, unless it be interpreted to mean that the child may be regularly promoted with a given minimal units of failure. This is the practice now in many schools; it is a just concession to the claims of a benignant nature which fashioned us according to such differing models. But this plan is not free from criticism; without a mastery of the rudiments of a given line of subjects the child will fail later on to grasp the more advanced branches in which these rudiments are vital elements. This plan would thus postpone the difficulty in schools where prescribed courses obtain.

(9) Accordingly, it is urged, let us accord him free election in the selection of his studies. So far as the elementary and secondary schools are concerned very few would come out flatfootedly in favor of this scheme. Social uniformity demands that the child be given a mastery of certain essential instruments of control. The choice of these instruments cannot be intrusted to the child.

A more fertile suggestion comes from another source: the plan to arrange special semi-vocational courses in the regular grade and high schools which appeal to the parent's purse and the child's interests, which will directly fit him for his life work, and which are symmetrical and complete in themselves; such courses to be elected by pupils who must discontinue their school training on finishing the grades or the high schools. A practical course of this sort, fairly complete in itself, to meet the requirements of the child who will not remain in school beyond the compulsory attendance limit, is now being planned by the Cleveland authorities and will become an integral part, at least as an experimental school, of the system this fall. These courses should make for increased promotion; and by awakening the child's interest, enthusiasm, and desire further to equip himself for

his life work, a sweet foretaste of which he has received in the elementary course, they should also result in increased attendance, if not in the high school then in the evening continuation school. This movement will contribute its share to the solution of our problem. But it is liable to defeat its own ends, unless the pupils are required to take those fundamental disciplines which are essential for their proper socialization and adaptation to the larger life of the community.

(10) A similar movement which will tend in the same direction is the German combination scheme of work and study, recently inaugurated in Cincinnati, Fall River, Fitchburg and other American cities. The students spend part of their time in school and part as apprentices in factories and shops. This is one suggestive means of reaching, advancing and holding the child until he has attained sufficient mastery. We shall wait with interest the outcome of this experiment, in its bearing upon increased promotion and attendance.<sup>4</sup>

(11) Another plan, suggested by President Hyde, bears upon our problem. This proposes giving *special credit* for a high *quality* of work. At present a 75% mark counts exactly as much as a 99% mark toward graduation. The wide range above the passing mark receives no special recognition so far as promotion is concerned. If now, an E mark be rated at 1.3 units, a G at 1.2, an F at 1 and a P at 1, it would then become possible for the child to receive 81 credits for 70 units of work. This would enable a child to finish his course in a shorter time in schools where graduation depends upon gaining a fixed number of units of credit, and this should tend to check early elimination. At the same time, if the child possesses distinct abilities in certain directions, his increased credits would counterbalance weaknesses in other lines.

This scheme has been tried at Columbia and the University of North Dakota. At the latter place there seems to be a

<sup>4</sup>For a favorable report on this plan, see W. B. HUNTER. *The Fitchburg Plan of Industrial Education*. School Review, 1910, p. 166ff.

difference of opinion as to whether it has proved a success—not from the standpoint of the problem of this paper, but because of certain evils which are involved in the plan.<sup>5</sup> Some of these evils are incident to the use of the elective system, and hence would not apply to those public schools where the courses are all prescribed. No tests, I believe, have been made to ascertain its efficiency in the public schools. So far as the mere question of promotion is concerned its reactions would seem to be favorable.

(12) Quite a different expedient is the limited segregation of the girls and boys. This has been tried in the Englewood High School during the last four years. The boys and girls have recited in different classes, the work has been adapted to the interests and needs of each sex, and the element of unfairness due to the difference of maturity of the two sexes at the same age, has been eliminated. Armstrong's<sup>6</sup> analysis of the results during these four years shows that there has been a striking increase in attendance and scholarship, particularly for the boys, which can be ascribed directly to the fact of segregated teaching. The boys for the first time in the history of the school outranked the girls in scholarship. The boys seem to suffer most in the mixed classes: they are more suited to the interests and needs of the girls than the boys. From 60 to 96% of the girls and from 87 to 100% of the boys in the various classes favored the segregated plan of conducting classroom work. The scheme is being tried in Columbus and Seattle: it is one of the possible solvents of the problem of early elimination.

<sup>5</sup>The reader who is interested in the controversy should read the original article by HYDE, in *The Outlook*, Aug. 2, 1902; SECOR, *Credit for Quality in the Secondary Schools*, *Educational Review*, 1908, p. 486; Ladd, *Credit for Quality in Secondary and Higher Schools*, *Educational Review*, 1909, p. 298, and *An Experiment in Credit for Quality*. *The Western Journal of Education* (Ypsilanti), 13, 1910; and criticisms by Kelly and Squires in the *Educational Review*, May and June, 1909. The plan was recently abolished at the University of North Dakota by a faculty vote of 22 to 7.

<sup>6</sup>ARMSTRONG. *The Advantages of Limited Sex Segregation in the High School*. *School Review*, 1909.

(13) Foster<sup>7</sup> has studied groups of high school boys in New York City, which were classified according to their physiological age, based upon pubescence (it may be based upon height, as this varies with the degree of pubescence). That is, boys of the same physiological development worked in the same classes. The results showed that boys so classified obtained a higher per cent. of promotion and a smaller per cent. of discharges or elimination (a saving of from 7% to 11%), as compared with unclassified groups. Boys of the same physiological age find it pleasanter to associate together, and can thus work more efficiently. Their mental capacities are also probably more nearly alike.

Finally, attention may be directed to a quite different scheme, a dual system of graduation by *certificate* and by *diploma*. It is eminently desirable to retain through the grades and the high school as many as possible of the fifty per cent. of pupils who do not now go beyond the fifth or sixth grades (according to Draper), or the eighth grade (according to Ayres), even though they are mentally delinquent or unable fully to measure up to the school's approved intellectual standards. The prolongation of their schooling in the face of adverse mental conditions would justify a resort to such extreme measures as are legitimate, provided only that the ultimate result tended toward the public good. Such measures would have to appeal directly to the parent and to the child himself. The backward child will not feel impelled to continue unless some tangible reward is held out as the prize of his efforts at the end of his journey. Such a tangible reward can be provided to meet the needs of the child of mediocre or inferior mental calibre by instituting a scheme of *certificate graduation*, as a supplement to the regular plan of *diploma graduation*.

<sup>7</sup>FOSTER. *Physiological Age as a Basis for the Classification of Pupils entering High Schools—Relation of Pubescence to Height*. The Psychological Clinic, 1909, 83f.

Stated in bare outline, *certificates* would be awarded to those pupils who have failed to reach the regular passing grade, but who have attained, say, 55 or 60% as the average in all branches (or some other arbitrary adopted unit). *Diplomas* would be awarded, as now, only to those who reach the higher passing mark, the traditional 70 or 75%. The diploma students would constitute the scholarship students.

To carry successfully these two standards side by side, it would be necessary early to impress the child with the important difference between these two attainments, and with the desirability of striving for the diploma credential, the distinctive badge of scholastic superiority. The diploma is the emblem of intellectual excellence. It would admit without examination to the state university. The "accredited" students would be only the diploma graduates. Certificate graduates would not be recommended for the freshman class in college. College authorities would have to admit them upon their own responsibility, or upon an entrance examination. Diploma graduation should distinctly be the *aim* of the pupil. At the same time the advantages of the certificate credential should be pointed out: it will entitle the pupil to a seat at the formal graduation exercises; to the privileges of membership in the alumni association; to the outside world it would certify that the child has been subjected to the educative influences of the school for at least ten, eleven or twelve years, and while it would not be any guarantee of excellence in scholarship it would be a testimonial of commendable efforts exerted against natural odds to win a prize, of capacity for persistent application and industry, of prolonged residence in an atmosphere permeated with the higher social, moral and intellectual ideals of the race. A child so environed, no matter how obtuse, could not fail to absorb such ideals of culture and principles of right living as would make him a better father, a truer citizen, and more capable producer, employer or employee. His services should command a higher price than those of a boy of equal years

and natural talents who lacks the advantages of a prolonged residence in a school environment. But the certificate plan should by no means provide a "snap" course for the indolent. It is not an invitation to the child to do careless, slipshod, namby-pamby work. The certificate should not be a free gift, but a real reward for genuine, earnest, faithful *effort*; otherwise its influence would be disastrous upon the general morale of the school. It would be subversive of those ideals which have brought the race to its present stage of perfection—the ideals of industry, persistence in the face of overwhelming odds, manful and courageous struggle, however disagreeable the task, as the price of excellency. Not the least advantage of the plan is that it would provide a way of rewarding *effort* instead of *attainment* only, as is now too frequently the case. Many pupils exert the greatest effort to do the work required of them, but are unable to "deliver the goods" and therefore lose the reward which should come in recognition of faithful application.

This proposed differentiation in graduation requirements is not without existent analogies. Oxford and Cambridge differentiate between students who come especially for culture and for social embellishment, and those who come with scholarly attainments as their goal and who are candidates for scholastic honors—the so-called *pass* and *honor* students. Numerous European and some American universities have long bestowed differentiated diplomas for differing attainments—diplomas with *Laude*, *Cum Laude*, *Summa Cum Laude* or without distinction. Numerous musical conservatories now issue certificates and diplomas of graduation. Does the time seem ripe for differentiated graduation from the public schools? The plan is feasible. It can be legalized. Is it just? Is it desirable? As conditions exist at present, there is too much pressure brought to bear to graduate inferior pupils—the reasons for which were analyzed at the outset. Teachers are prevailed upon to bend to this demand, at the sacrifice of their professional ideals and of

their self-respect. If the system of promotion or graduation is made so elastic that the inferior pupil may be regularly discharged from the schools, but only with a *certificate*, there will be far less insistence—and just insistence—on the part of teachers to obstruct the progressive movement of the pupil through the grades. There will not be such an army of repeaters as now encumber the educational system. And this will be accomplished without any degradation of the passing standard for diploma graduation, as would be the case with the first, second and third schemes referred to above. At least such degradation of the standards of good work would have to be resisted with uncompromising fervor to insure the success of the plan. Certificate graduation is a measure of last resort for faithful but weak children, but not for “snap-hunters.” The details of the plan would have to be perfected after due trial: it ought to be put on the program of some experimental school for a thorough try-out.

If we look for a panacea for checking the mortality in the grades due to non-promotion we shall look in vain. But if we avail ourselves of some of the regulatives discussed above, judiciously selected and properly correlated, we shall be able to meet the situation with intelligent foresight and intelligent attack.

Over and beyond these measures we shall make most rapid strides toward the *proper* solution of this problem when the American parent will turn face about and heartily join hands with the school workers to eradicate the unwise and almost universal tendency in the American home and school everlastingly to pamper and coddle childhood; to shield it from effort and fatigue; to remove all its mountains of discouragement and of difficulty, and all the little hills of disagreeable and obnoxious tasks, under the conviction that childhood is only to be amused and entertained; to subordinate everything to the demands of instinct and impulse instead of the demands of nurture and discipline; and to play fast and loose into the hands of a young tyrant who recognizes

no need but that prompted by the whim of the moment and the immediate satisfaction of the pleasure-pain demands of the organism. Parents can do no greater kindness by their children than to regard it as a paramount duty of the home to reinforce the first great lesson of the schools, that there can be no genuine *excellence* of attainment without *work*, and that unflagging application is the price of success in any sphere of life where genuine achievement counts. Parents should be the first to preach the inherent dignity of work and the ignobility of shirking obstacles and retreating from the front because of the discouragements of the battle. Children will do well to learn early that life is not all a rollicking seesaw, that discouragements and obstacles must be met and subdued, and that the ideal of genuine success is not a life of ease but of aggressive service and conquest. They need to learn to play the game of life for all it is worth, to hit the line hard without flinching, and to be content with whatever success genuine merit has brought them. "Strength comes from wrestling," and not by working below one's level of attainment. We do not wax strong on mere exercise, but by vigorous exertion. A vigorous, virile, resourceful race cannot be reared upon a substrata of spineless, mollycoddle children. Childhood effeminacy spells racial impotency. Parents must realize that school work is not all play, but a youthful battle royal in which only he wins the prize who is willing to pay the cost in strenuous, persistent, independent *labor*. They must come to realize that what is needed just now is a raising rather than a cheapening of the school standards. The schools must be *leaders* rather than followers; they must establish standards of excellence for the community; primarily they should be *standard-making institutions*. As President Hadley has so well said regarding the universities: their chief function is to furnish standards. We have been teaching the child to *play* so well during a score of years that now there is need to teach him to *work* again. Work is in danger of becoming a lost art with the



modern hot-house child. There will be fewer non-promotions when parents begin to preach the gospel of work as the way of intellectual salvation for the indifferent ne'er-do-wells and the indolent delinquents in the schools.

Nor shall we do ought but overreach ourselves if we attempt to eliminate entirely the mortality of the classroom. Theoretically waste may be eliminated completely with the *dead* stuff of the factory and the shop; it is neither possible nor desirable with the *living* material of the school. The laws of waste-prevention with inert materials do not apply to the dynamic forces of the classroom; the efficiency criteria for shop output cannot be used as a measure of school output; factory economics and school economics are not interchangeable; practical economic measures must be compatible with the nature of the materials concerned. We are in grave danger in these days of overworking the "business conception" of the school, and of hearkening to that absurd type of "business demand" upon the schools for the total elimination of waste which views the child pretty much as a packer regards a steer, which, after it has been carefully fattened for market, must be prepared for the trade in such a manner as to rule out every conceivable element of waste.

Human variation and human attainment are such that the absolute elimination of the waste from non-promotion would be purchased at too high a price—the total surrender of any tangible or definite standard of intellectual attainment. To comply with such a demand would be to fly in the face of all precedent, the accumulated experiences of the race on this point, and the most cherished ideals of a profession whose paramount duty perhaps is the setting of proper standards of life and action. In fact, a graver injustice is involved in the annual-promotion fetish, which by its rigidity defers promotion to the year's end for the ten to fifteen per cent. of "bright" pupils who are prepared for double promotion within the academic year, than in the

system of non-promotion of the inefficient at the end of the year.

That the problem before us is vital and calls for prompt and effective action is indicated by the fact that a large part of the mortality of fifty per cent. in the upper grammar grades is directly attributable to non-promotion. According to Thorndike,<sup>8</sup> one-third of the failures of the last grammar grade are eliminated before the next year's enumeration, one-fourth of the failures in the seventh grade, about one-fifth of those in the sixth, and one-sixth of those in the fifth. We believe that the measures discussed above provide a sufficient remedy for checking as much of this waste as legitimate school economy demands.

<sup>8</sup>THORNDIKE. *Promotion, Retardation and Elimination. Psychological Clinic*, 1910, p. 253ff.

# THE USE OF ILLUSTRATIVE EXPERIMENTS IN CLASSES IN EDUCATION.

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That each of the principal subjects of study has a method of approach peculiar to itself is a generally recognized fact. It is with good reason that we speak, for instance, of the importance of the early acquisition of a notion of scientific method by students of any of the sciences, or of the value of teaching students of psychology to begin as early as possible to "psychologize." Teachers of history properly try to give young college students some realization of "historical method," and instructors in philosophy try to get young people to "philosophize." The acquisition of a few of these fundamental attitudes is perhaps the essential thing in a liberal education.

In the study of Education, is there any attitude or method so essential and fundamental as is the scientific attitude or method to the young scientist or the tendency or ability to philosophize to the neophyte in philosophy?

Before attempting to give an answer to this question, we should remember that out of the chaos of conflicting opinions in regard to the nature and aims of education two generally recognized views have emerged. The first looks upon education as a social institution and concerns itself with the subject-matter and processes of instruction primarily with reference to their bearing upon the training of young people to minister effectively to the needs of society as a whole. From the second point of view, education concerns itself with questions of the relation of subject-matter and pro-

cesses of instruction to the present and future well-being of the child as an individual. Practically, of course, these two aims do not admit of sharp differentiation, but in first courses for undergraduates there is a certain advantage to be gained from a consideration of the problems of education now from the one, now from the other point of view. What I have to say in this paper concerns itself with education in the second of these senses, the education of the individual.

Pestalozzi, Herbart, and Froebel, in spite of the crudity, error, and artificiality of much of their work, have given to us that which may properly be called a generally recognized point of view or attitude or method of approach to the study of education, namely, the genetic or developmental point of view. In the study of the education of the individual, this is comparable in importance with the evolutionary point of view in the study of biological problems. It is reasonable to assume, therefore, that whatever else an introductory course in the principles of education should give to young students, it should at least make clear to them that education is development and not mere accretion.

Few undergraduates begin the study of education with any very definite realization of this fundamental truth. Most of them have forgotten the pit whence they were digged,—their own early school experiences. Many of them still look upon education as a purely informational process, and think of a grammar-school child as differing from an adult intellectually merely in the smaller number of the textbooks which he has mastered. There is real need, therefore, for a good deal of emphasis upon the point of view or attitude which recognizes the educative process as essentially one of organic growth.

Some students are helped toward this fundamental conception of education by being made to realize the slow stages by which the race has reached its present degree of advancement in such a subject, for instance, as arithmetic, or writing, or physics. A lecture or two on such a topic has no nec-

essary connection with culture-epoch theories: it may be given solely for the purpose of helping the student to get rid of fallacious notions of the nature of mental acquisition.

A more positive method of attaining this end consists in the use of simple illustrative experiments the aim of which is to demonstrate to students the actual stages of development of public school children in one of the more elementary arts or sciences. One such simple experiment I should like to describe, not because its results have any special value, but because of its pedagogical efficacy in aiding young students toward a right outlook on the educative process.

With the permission and co-operation of the principal and teachers of a neighboring grammar school, a test was given, under the direction of the members of a class in Education, to all the pupils of the school above the first grade. The first grade was omitted because the mechanical difficulties in penmanship for children in that grade make results of written work hardly comparable with those of children of the upper grades.

At a certain hour, in all the grades except the first, the pupils were asked to write for fifteen minutes on the subject, "What I Saw on my Way to School." This time-worn and hackneyed theme was selected in order that difficulties as to subject-matter might be minimized. The students of the class in Education were distributed through the grades during the exercise, but it was thought best to have the directions given to the children by the regular teachers. These teachers had previously been instructed as to the exact form to be used in announcing the work to their pupils. Neither pupils nor teachers knew of the purpose of the test. The papers were collected by the students of Education, and were divided among them for study. Each paper was read and marked by at least two students; points of disagreement were noted and afterwards referred to the entire class for decision.

The following directions were given to the students for

their guidance in marking the papers:

1. Rapidity.

Count the words in each paper, in order to arrive at a knowledge of the comparative facility of composition.

2. Count the number of errors in spelling. (Each misspelled word counts as one.)

3. Use of capital letters. Count the errors in capitalization in each paper. This should include:

Instances of capitals used erroneously.

Instances of small letters used erroneously for capitals.

(Errors in capitalization due to ignorance of sentence structure, as well as errors due to ignorance of the distinction between proper and common nouns, etc., are included.)

4. Sentence Structure.

(a). Count the simple sentences.

(b). Count the compound sentences.

(c). Count the complex sentences.

5. Count the descriptive adjectives and adverbs.

(Participles should be counted only when their functions is clearly descriptive.)

6. Abstract words.

Count the nouns which stand for abstract qualities of ideas, such as: virtue, duty, conduct, action, consciousness, ratio, nobility, etc.

7. Figurative language.

Count the instances of unmistakable use of figures of speech.

8. Reasoning.

Count the cases of induction or deduction.

These directions, a copy of which was given to each student, were discussed in class before the marking of papers was begun, and a ruling given on all doubtful points. Each student passed upon some of the papers from each grade. As the same paper was read always by at least two students,

the record in each case represents the opinion of both readers, or, in the case of disagreement, the verdict of the class.

The results of this study of the papers were tabulated by the students as follows, the numbers representing averages per pupil in the given grade:

TABLE I.

Grade	Rapidity; Average number of words used	Misspelled words	Errors in capitaliza- tion	Average number of simple sentences	Average number of compound sentences	Average number of complex sentences	Average number of abstract terms	Average number of descriptive words	Average number of figures of speech	Average number of instance of reasoning
2	24.60	3.72	.66	2.72	.44	.27	0	2.22	0	.11
3	39.00	2.32	.28	2.75	.68	.75	0	5.14	0	.07
4	46.27	1.52	.52	2.86	.66	1.04	0	3.86	.05	.10
5	72.03	2.38	.81	1.96	1.38	2.19	.19	5.19	.42	.50
6	68.50	1.25	.28	2.00	1.10	1.90	0	7.28	.39	.75
7	64.13	.75	.44	1.00	1.25	1.63	.19	8.00	.56	.75
8	92.37	1.53	.25	.56	1.50	3.13	.38	10.56	1.19	1.06
9	109.70	.12	.18	2.41	1.24	2.94	.59	12.64	1.35	1.70

A table showing the percentage of errors in spelling and capitalization to the total number of words used, and the percentage of abstract and descriptive words to the total number of words used in each grade brings out still more clearly certain facts in the acquisition of written language by the child:

TABLE II.

Grade	Per cent. of misspelled words to total number of words used.	Per cent. of errors in capitalization to total number of words.	Per cent. of abstract terms to total number of words.	Per cent. of descriptive words to total number of words.
2	14.79	2.87	0	8.69
3	5.99	.74	0	13.29
4	3.39	1.13	0	39.71
5	3.31	1.12	.26	8.28
6	1.82	.42	0	10.62
7	1.17	.68	.29	12.47
8	1.22	.27	.41	10.76
9	.48	.16	.53	11.47

The following table shows the percentages of simple, compound and complex sentences, and the percentage of instances of reasoning to the total number of sentences in each grade:

TABLE III.

Grade	Per cent. of simple sentences to whole number of sentences.	Per cent. of compound sentences to whole number of sentences.	Per cent. of complex sentences to whole number of sentences.	Per cent. of instances of reasoning to whole number of sentences.
2	79.03	12.90	8.07	.44
3	65.81	16.24	17.95	1.71
4	62.50	14.58	22.92	2.08
5	35.42	25.00	39.58	9.03
6	39.72	21.99	38.29	14.89
7	25.81	32.26	41.93	19.34
8	10.84	28.92	60.24	20.48
9	36.52	18.84	44.64	25.89

As the school in which the tests were made is a small one, there being only 169 pupils above the first grade, further tabulations of results (showing average variation, percentages of improvement, etc.) were deferred until larger numbers could be tested. Each student was asked to write out a statement of her conclusions, in so far as these could be made from so comparatively small a number of cases, and the class discussions of these papers gave evidence that the experiment had fulfilled its purpose of bringing home to the mind of the student some notion of what is meant by the term "development" as applied to the child's acquisition of the art of written language.



## COMMUNICATIONS AND DISCUSSIONS.

### WILLIAM JAMES.

William James, the most eminent American scholar in the sciences of man, died at Chocorua, New Hampshire, on August 26. Educated in the schools for the profession of medicine, and for some years a teacher of physiology, he early made himself master of psychology and philosophy, between which his life-work was divided. Education, in common with the other arts and sciences of human nature, is in his debt in the case of every topic treated by him. The *Principles of Psychology*, distinguished no less by range and accuracy of scholarship than by genius in expression, would, in any case, have been a fundamental book for students of education. But Professor James had also a wonderful sense for reality in mental facts, by which he purified the psychology of the English school from its verbalisms and selected from the newer experimental work what really counted toward the explanation of the actual stream of conscious life. As a result, the chapters on instinct, habit, association, dissociation, imagination, memory, conception, reasoning, the emotions and the will are, after a score of years, still indispensable. Sickness, and finally death, prevented the full elaboration and expression of his philosophy in a form comparable to the *Principles of Psychology*. In *The Will to Believe*, *Pragmatism*, *A Pluralistic Universe* and *The Meaning of Truth*, and in a notable series of shorter contributions he had begun to apply to the problems of philosophy the same immunenness to verbal plausibilities and deceptions.

By the publication of the *Briefer Course in Psychology* and the *Talks to Teachers on Psychology*, Professor James became known to teachers of every class. The lectures composing the latter volume were only an episode in their author's work, but having them to write, his nature could tolerate no imperfection. And, being in some measure an expression of his nature, they have been not only a model of popular science, but a power working everywhere for openmindedness, sincerity and modesty in thought about teaching.

As a teacher he manifested, when occasion offered, the same brilliancy

and marvelous choice of epithet that characterized his writing. He was utterly without pretentiousness or dogmatism. The characteristic most striking to his students was his kindness. His judgment seemed never to err except through charity or trustfulness, and a large fraction of his life was given up to personal service at the call sometimes of friendship, sometimes of need and sometimes of mere distress. He was so appreciative of all points of view and so tolerant of all honest differences in opinion that he founded no "school" of psychologists—trained no group to one type. He did not personally make converts, much less declared disciples. There are no Jamesians. But under no other name would all American psychologists be so willingly enrolled.

William James was recognized by the philosophers and psychologists of America as their leader, esteemed by our most distinguished university as its most distinguished member, and known to educated men and women as a master of English writing. It is the good fortune of education that in so many ways it profits by the life-work of the ablest thinker of his day and country.

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### ONE FUNCTION OF THE TEACHER IN MEMORY WORK.

The present writer has been conducting during the past year several experiments in memory, and has found, entirely apart from the object of the experiments, several facts which throw some light on the function of the teacher. These facts, which come from a study of memory, correspond very closely to what Book<sup>1</sup> found in the case of habit-formation. It is not our purpose to report the experiments here, they will be reported in full later, but merely to call attention to one or two facts of interest to the teacher.

In one series of experiments, the object was to find the rate of learning of different individuals and the relation of repetition to retention. The material used was meaningful material entirely new to the learners, and the method was to read the amount selected to the learner till he could state correctly all the facts. After each repetition, the learner reproduced as much as he could, and his record was kept by the experimenter. In other cases, the learners read the material, sometimes si-

<sup>1</sup> W. F. BOOK: *The Role of the Teacher in the Most Expeditious and Economic Learning*. The Journal of Educational Psychology, 1: No. 4, p. 183.

lently and sometimes aloud. Very early in the experimental work, it was noticed that if a learner got a point wrong in the first or any early repetition, the error consistently reappeared after future repetitions. In the early presentations, certain words, phrases or sentences would be given particular interpretations, and when the words came again in later readings, the first interpretation came again also. It seemed that the first meaning conveyed by the words would come as a matter of course in future readings and prevent any other interpretation. Since it was impossible to get more than about half of the facts at one reading, many erroneous meanings were usually conveyed by the word symbols in the first reading; these errors were on a low level of attention in later readings, the focus of attention being occupied with facts not gotten at all in the first reading. It was only after these other points had been gotten and fixed that the symbols erroneously interpreted would come to the focus of attention and the right interpretation appear. Usually, however, the learner would finally get the right meaning, although sometimes the right meaning would not appear till attention was called by the experimenter to the particular point. Sometimes a phrase used by the learner would be just slightly different in meaning from the one used in the matter presented to him, and in these cases, the learner would persist to the end in giving his own *slightly incorrect* expression. It therefore appears that the length of time required for a learner to get all the points in a given material is in part dependent on the number of points got wrong in the beginning that must be unlearned later.

In view of these facts, which were very clear from the experiments, the importance of first readings and first presentations of subject matter appears to be very great, and the function of the teacher as related to the learner would seem to be to keep the learner right in the early stages of learning a given subject matter. Retention depends in part on impressions and repetition. Before repetition begins, it is the business of the teacher to see that the pupil has the *desired* impression. It is a matter of economy to take plenty of time at the beginning of any process of learning that involves memorizing to make the impression clear and vivid, and to help the pupil to get the right meaning, before proceeding to repetition, to drill.

To make a direct application of this principle: it is evident that first presentations should usually be made orally by the teacher in order to secure the most economical learning, because in this way the right impression, the correct meaning, is most likely to be given. The pupil

should not ordinarily get his first impressions of subjects from the text-book. In presenting a new topic, a teacher would, then, to proceed economically, present it orally with abundant illustration and demonstration, and then, before dismissing the class, should learn by rapid-fire questions put here and there how the matter has been received by the pupils, set them right where wrong and clear up all doubtful, hazy points. This is important even if the matter is to have no further attention till the next recitation period, because of some sort of organization that beyond question goes on in the pupil below the conscious level. But, ordinarily, before the next recitation, the pupil will go over the same matter by reading, or will in some concrete manner apply the principles learned. In this case it is all the more important that his first impression be clear and rightly interpreted.

In the applications just mentioned, the writer has had in mind chiefly elementary and high school work, but he has used the above principle, combined with others that have come out of memory studies, with university classes. The last half-hour of each lecture period is used in presenting the new topic. The students, before the next period, read over their notes and read up on the same topic in the text-book or in the references assigned, and the first half of the next lecture period is given over to a discussion of the topic by the members of the class. The students have, then, first an ear presentation, then an eye presentation and finally the motor expression. The results obtained justify the practice which numerous experiments in memory have shown to be sound.

W. H. PYLE.

University of Missouri.

## ABSTRACTS AND REVIEWS.

MICHAEL M. DAVIS. *Psychological Interpretations of Society.* (New York: Longmans, Green and Company, 1909. Pp. 260. \$2.00.)

This is the most extensive survey in English of the contributions made to the interpretations of society from the psychological point of view. Dr. Davis wrote his doctor's dissertation on Gabriel Tarde, the French jurist and psychological sociologist. The present volume is a natural outgrowth of that dissertation,—in fact, over one hundred of its two hundred and sixty pages are a reprint, with modifications, of that earlier work. That accounts for the disproportionate amount of space given to Tarde as compared with the other psychological sociologists.

The author divides his book into three sections, (1) the social mind, (2) social function, and (3) applications. The first section is devoted to a brief historical review of writers whom he calls the "founders" of psychological sociology. Another class of men, among whom he places writers of as different methods as Münsterberg and Boutmy, on the one hand, and Giddings and Durkheim, on the other, he groups together as interpreters of social unity from various aspects. In the third chapter of this section he passes in review the men who have contributed to the development of the problem of the socialization of the individual by society; some, like Stanley Hall and Baldwin, approaching it from the study of development of the child, and others from the analysis of the Ego, like James, Royce, Ormond and Cooley. In the fourth chapter he devotes himself to a keen criticism of the writers who have tried to define the social mind. On the basis of this criticism he analyzes the term "social mind" more closely, and by a process of elimination arrives at a definition of the social mind as "a mass of common beliefs, sentiments and determinations possessed by the individuals of a group with the added consciousness that the other members simultaneously cherish them."

In the second section our author proceeds by just the opposite method. Instead of reviewing a large number of writers on "social function," and by criticism and elimination arriving at a conclusion which meets all the objections raised to the views criticized, he proceeds to study

intensively the theory of Gabriel Tarde, then criticizes it, and endeavors to relate it to the theories of others.

In the third section he deduces some conclusions on the relation of social function and social genesis, in a chapter which he calls "psycho-social principles," suggests how these principles apply to the interpretation of history, and applies his conclusions to an exposition of the inter-relation of the one and the many in society.

In this book Dr. Davis has laid all sociologists under obligations by his masterly, though necessarily brief, review of the literature on the psychological side of sociology and by his keen criticism of the various writers passed in review. While he is a student of Professor Giddings, and therefore shows the influence of that virile sociologist on his thought, he has not slavishly followed Giddings. On the contrary, his criticism of the latter's analysis of the social mind (pages 47-49) is one the best I know. It is sympathetic, yet discriminating and constructive withal. Likewise, in his treatment of Tarde, Dr. Davis shows his independence of thought by pointing out in a telling analysis that Tarde's theory of imitation "is only an illuminating half-truth." He excels when criticising a writer and advancing upon the writer's foundation to a further analysis. In the last section, where he strikes out on some original lines by way of the application of his principles, one feels that he is not so much at ease. His grasp of the literature of the "great-man" controversy, for example, which he treats in his fifteenth chapter, is not so firm as that of most of the other subjects treated earlier in the work. He seems to know nothing of what Ward has said on that controversy in his *Applied Sociology*. This, however, is an exception to the unusual range of his reading, shown throughout the other parts of the book. Moreover, one cannot but regret that he gave such undue emphasis to Tarde's theories in a work on "psychological interpretations of society" and therefore necessarily had to treat all the others so briefly. A further exposition of the other writers passed in review, together with his clear-sighted criticism upon them, would have more than atoned for a briefer treatment of Tarde. This also would have enabled him to elaborate the synthetic portion of his work, the part which suffers in comparison with the brilliant expository and critical sections of the book. Nevertheless, the production is a most valuable piece of work in a field which knows many brilliant workers.

J. L. GILLIN.

State University of Iowa.

EDWARD C. DEVINE. *Misery and Its Causes*. (New York: The Macmillan Company, 1909. Pp. 274. \$1.25.)

This book deserves the attention of the philanthropist for two reasons: first, because it is written by a scientifically trained leader in organized charity, and, second, because it is a product of our greatest social laboratory, the city of New York.

What are the causes of misery? The answer here given may be disappointing to him who ascribes them to the evils he happens to be combatting. The central thesis of the book is that they are more economic and objective than moral and subjective; they are, in brief, poverty and maladjustment; lack of health and work and friends; adverse conditions in dependent families, and so following. It is not so much moral delinquency on the part of the individual that causes misery, as ignorance and misfortune, supplemented by environmental evils, such as overcrowding and bad sanitation.

Relief should be apportioned, not according to desert, but according to need (page 10.) "Out of health" is to be supplanted by "out of doors" (page 109.) "Alcoholism," the author says, "is half a disease, half a crime, and altogether the greatest foe to health and vigor" (page 111), but is more consequence than cause.

The reforms most needed are as follows: A system of eugenics that will prevent the rapid multiplication of the miserable; a better protection of childhood, respecting labor and hardships; conditions that will lengthen the productive period of life; the removal of the influence of criminals running at large; insurance against death, old age, accident, sickness, etc., so that burdens may not fall on those least able to bear them (page 100); adjustment of education to actual needs; a liberal system of relief; good standards of living, recreation, etc., and finally, a truly socialized religion.

Each chapter is based upon extended concrete data fresh from the field, and the conclusions are presented in an interesting manner, with conclusive argument.

CHARLES DEGARMO.

Cornell University.

PAUL SOLLIER. *Le Doute*. Paris: Felix Alcan, 1909. Pp. 407. (Bibliothèque de Philosophie Contemporaine.)

In this volume the author takes issue with those educators and others who for the past twenty years have, as he thinks, overemphasized the necessity of bending our educational efforts upon the will. They lose sight of the fact that in order to will it is necessary to know that of which one is capable, and that which ought to be done under given circumstances. In other words volition requires knowledge of one's self and of the external world, which, when acquired, will work itself out into appropriate forms of activity unless the necessary incentives and motives be lacking or distorted, or unless there be a conflict of tendencies, emotions, real or imaginary images, beliefs, and other elements constitutive of personality. Such barriers to action are the phenomena of doubt. In pathological cases they may be described as obsessions or phobias. These are the phenomena which Dr. Sollier investigates. He carries his analysis and comment through nine chapters which deal with the conditions, evolution, consequences, and causes of doubt, the mental and physical reactions of the doubter, the mechanism and nature of doubt, and the physical and psychical means of opposing it.

The feeling of physical insufficiency, impairment of health, inability to do systematic mental work, tendency to dissimulate, and unfitness for anything but the work of a subordinate—these are some of the consequences of the condition of doubt. The list is formidable enough to justify the author's plea that educators, physicians, sociologists, and psychologists should become acquainted with the doubter as a source of danger to the race, to society and to himself. The question then is, obviously, "What can be done to improve his condition?" Specific directions cannot be given. The psychotherapist, here as elsewhere, has decided limitations. It is a work for the educator, the physician, or the sociologist who can inspire the patient's confidence in himself.

ROBERT H. GAULT.

Northwestern University, Evanston, Illinois.

P. MENDOUSSE. *L'âme de l'adolescent*. Paris: F. Alcan, 1909. Pp. v, 301.

Great credit is due M. Mendousse for the splendid contribution which he has made in this work to the new study of adolescence. The book begins with a consideration of the early signs of adolescence



and a discussion of puberty, aptly called a "second birth." The author reviews the rites and symbols which make puberty an initiation into manhood among various peoples, analyzes its character and connection with sexual life, describes the psychic states awakened by the new function, the perversions of the sex instinct, the changes which frequently take place in the elements of personality and points out very cogently the necessity for instruction in matters of sex: "The least intelligent and least moral of all attitudes toward these questions is that of ignoring them. Those parents and educators who think they ought systematically to close their eyes to the sex side of puberty, or to suppress all thoughts of sex in the minds of young people, are committing a veritable crime against the moral and physical health of the future generation, and run the risk of locking the door, perhaps forever, to the solution of great problems, the surest key to which is found in the love between the sexes."

The second part of the work is devoted to the new faculties which puberty arouses. First, love is analyzed with much keenness and insight; then the author discusses the dreams resulting from that "flood of imagination" which is one of the characteristics of puberty, and which brings with it an awakening of æsthetic appreciation in art and literature. The affective life develops very rapidly at this period. Then comes the dialectic stage; the adolescent shows himself more of a reasoner than the child, attributes a greater importance to words, relishes slang and manifests a decided taste for philosophy and "those abstract considerations in which ideas seem to suffice for themselves." Finally, we have the development of courage, which is ascribed to "the growth of muscular strength and general vigor," and is said to have as its chief result the strengthening of voluntary attention. Several pages are devoted to the impulses which underlie this voluntary attention, to bashfulness, to the desire for independence which manifests itself in a definite fashion at this age and which one must be careful not to oppose too decidedly.

The third and last part has as its title "The Anarchy of Tendencies." M. Mendousse develops very clearly the important thought that "the personality of the adolescent is essentially incoherent and unstable." First of all, there are organic discordancess; as a result of growth the somatic proportions are disturbed and there arises a general lack of co-ordination of the bodily organs. Further, "the greater part of the new tendencies have but little permanence in consciousness," there is a "mental instability, an incoherent multiplicity of desires, a fluctuation

in tastes and plans." From this comes a frequent tendency to suicide. Finally, as a result of this incoherence, the adolescent is especially prone to excess, and M. Mendousse rightly emphasizes the important role which physical fatigue plays in his education. The conclusion follows that the adolescent is neither a big child nor a young man, and that, therefore, he should have an education specially adapted to his needs. The author enumerates the important points of this special pedagogic method, and thinks that they can all be summed up in the following: "Cherish by every possible means and in every branch of his activity the spontaneity of the adolescent. Use constraint only in case he would not, of himself, rise to that minimum of effort, knowledge and morality without which the adult would fall below his manly estate and his social function." In closing, he emphasizes the utility of education and the value of a well-grounded pedagogy in the hands of enlightened educators, showing that "the worth of a people varies in proportion to the sum total of devotion which it expends on its young."

The book is the fruit of much painstaking toil and careful reflection and shows a commendable familiarity with the literature of the subject, especially that derived from American sources. The author discloses great keenness of observation and analysis, and clothes his thought with a lively and interesting style. We hope he will be encouraged to persevere in the investigations on which he has made such a promising start.

G. VATTIER.

University of Caen, France.

ALFRED BINET. *Les idées modernes sur les enfants*. Paris: Flammarion, 1909. Pp. 344. Fr. 3.50.

"This book is a balance sheet," are M. Binet's first words. In it he has sought to bring together the lessons which thirty years of experimental research, carried on chiefly in America and Germany, but to some extent in France, have taught us concerning education. Naturally, owing to the restricted scope of the book, he was obliged to confine himself to those topics which seemed to him most interesting and most vital. He has especially endeavored to show that there is no such thing as "the typical child," but that, on the contrary we are confronted by a multitude of individual differences which, in the past, have been altogether too much ignored. The same instruction is not suitable for

all children; rather each child should be treated in a different fashion according to his nature, not only for his own welfare but also in the interest of society. It would be very desirable, according to M. Binet, to introduce into pedagogy the methods of measuring the learning process that have been perfected in the laboratories, for such measurement "would show us the real progress of each pupil, would enable us to estimate the professional worth of teachers and would furnish us with a means of determining the value of pedagogic methods."

The author has no difficulty in demonstrating the importance for education of a careful study of child physiology. Is not the failure of pupils frequently the outcome of a physical incapacity for work? Do not intelligence and bodily development always go hand in hand? Is not mental ability reduced by the lowering of the physical level? We should, therefore, have careful measurements made in this field, too. It is not merely a matter of pedagogical interest; it is a social question; for the future of our race, the organization of our society is at stake. The sense organs should be carefully tested, for M. Binet shows clearly the role which normal organs of vision and hearing play in a child's life. All progress depends on them. They should be examined by both physician and teacher.

In the following chapter the author develops at length the method to be pursued in measuring intelligence—a method which promises valuable results, provided it is employed by competent persons. He vigorously attacks the prejudice that intelligence is not educable and presents in support of his contentions some strikingly interesting facts drawn from abnormal classes. M. Binet lays particular stress upon memory and shows how it can be measured and developed by methodical and graded exercises. The chapter on the aptitudes of children is, as he says, "only a rough sketch," yet it contains a mass of exact and carefully analyzed data, notably in regard to certain types of intelligence, such as the reflective and the intuitive, the objective and the subjective, the practical and the literary. Along with intellectual work M. Binet insists that manual training should receive consideration, for those pupils who are inept at the first often make a striking success at the second.

A final chapter is devoted to laziness and to moral education. We can distinguish two types of laziness, the one inherited, the other acquired; the latter can be overcome if properly treated, and even the

former is not altogether incurable. The whole subject of moral education is admirably handled and makes exceedingly interesting reading. The ideal of moral education, according to the author, is "the betterment of the individual, shaping his conduct to social ends, and enabling him to adapt himself the more perfectly to his environment," and the means at the disposal of the educator for the attainment of this end are rapidly passed in review.

Does M. Binet, who is so ardent a partisan of the new pedagogy, completely reject the old? On the contrary, he exerts himself to conciliate its adherents. "The old pedagogy should furnish us with the problems to study, the new pedagogy, the methods of procedure for that study." But he does not leave us great confidence in present-day tendencies, and his conclusion in this connection is worth quoting in full: "Thanks to all these efforts we are beginning to render our knowledge of children more precise, more practical, more useful. Those who familiarize themselves with these methods of study reap the advantage of avoiding mistakes, of correcting prejudices, of fixing their attention on decisive points, and of knowing precisely what must be done in order to arrive at sound conclusions. Considered from this point of view, pedagogy ceases to be a dull, superannuated rule of thumb; it enables us to attain a better understanding of our children's minds, and is already beginning to teach us how to go about the education of their memory, their judgment and their will. It is of service not only to the children but also to ourselves, for, reacting upon our own lives, upon our weaknesses and infirmities, it makes us realize how much we could gain by applying these methods to our own progress. This should be the endeavor of all those who seek to regulate their lives with some intelligence and foresight. It should be the special endeavor of those who occupy positions of authority, and these would do well to remember that, instead of being so preoccupied with material science, with material prosperity, with material industry, it is just as important, perhaps more important, to devote their attention to the proper direction and organization of moral energy; for it is moral energy that rules the world."

The book is full of original ideas, and it will be certain to have great pedagogic influence, for it is indispensable to those who are engaged in educational work. Numerous anecdotes, accurate and detailed accounts of investigations, and the evidence at every point of profound learning

coupled with long experience, make the volume delightfully interesting reading, and render it the best work on pedagogy that has appeared in France for many years.

G. VATTIER.

University of Caen, France.

FELIX ARNOLD. *Attention and Interest*. New York: The Macmillan Company, 1910. Pp. viii, 272. \$1.

This book, or "essay," the author tells us in the preface, "is an attempt to clarify and arrange the many facts that have been brought to light by numerous experiments in psychological laboratories on the psychology of attention and interest." There are in all ten chapters and the material of each is presented under the categories of "description," "illustration," "development," "explanation" and "definition." When skillfully handled, this scheme no doubt possesses much merit, but in the hands of our author it involves a vast amount of repetition, and as each category is broken up into a large number of sub-topics that are all duly numbered and labeled, first in capitals and then in italics, and then frequently sub-numbered, but little coherence and progression are left in the treatment. The illustrations and experiments cited are good, if not too plentiful, but no attempt seems to have been made to bind the subject into a unity on the basis of fundamental principles.

Almost every fact and principle in general, experimental, genetic, and physiological psychology seem to be touched upon, but their relation to attention and interest is often remote. In fact, "attention" appears to be used as practically synonymous with "consciousness," and the book should, perhaps, be regarded as a treatment of the functional psychology rather than of attention and interest in the restricted sense.

The last two chapters bear the general title of "Education" and one would naturally expect to find in them a psychological analysis of attention and interest in their educational bearings, but this is not the case. Only one short section (pages 254-257) may be said to touch upon this topic, while the rest of the space is devoted to a detailed, often trivial, treatment of class-management, with an occasional digression into method.

But in spite of these defects and limitations, the book may prove to be of considerable value as a reference book for the educational psychologist.

W. C. RUEDIGER.

The George Washington University.

WILLIAM H. SUTHERLAND, M. A., President State Normal School Platteville, Wisconsin. *The Teaching of Geography*. Chicago: Scott, Foresman & Co., 1909. Pp. 295.

Most teachers of geography in the common schools have no adequate idea of the scope and the importance of this subject as a means of education and for practical life. One reason for this is that most of the writings on topics in geography are widely scattered in magazines and are generally inaccessible to the majority of teachers. The result too often is undue emphasis upon unrelated details. Not long ago the main effort in the teaching of geography was turned toward the learning of isolated facts and more recently there was a strong tendency toward the other extreme of causal relations. Teachers need the broader view, to know the field as a whole and its divisions and their relations and importance, to get the proper balance. This book is a praiseworthy effort to give a general idea of the nature and scope of geography and to outline the more important methods of teaching it.

The work is divided into three parts. Part I discusses the nature of geography, geographic controls, phases and aims of study and the relation of geography to other sciences. Part II discusses methods of teaching, giving special attention to inductive and deductive methods and the use of textbooks. In Part III suggestions are made as to the use of illustrative materials and maps. Each chapter is introduced by an outline and followed by a set of questions, suggestions for further study, and a brief bibliography.

The book is carefully written, but the diction is often difficult. The author demands of the teacher a broad knowledge of geography and related subjects. He emphasizes the study of geographical facts in causal relations. A good amount of illustrative material is used. On the whole the book is an acceptable contribution to the educational literature on this subject.

DAVID GIBBS.

Oswego State Normal School.

PERCY G. STILES. *The "All or None" Principle and its Implications*. American Physical Education Review, 15: January, 1910, 1-5.

When cardiac muscle is stimulated, *e. g.*, by applying induction shocks to a terrapin heart, any stimulus that initiates a visible response develops a full response, a full-sized and typical beat. This is known as the "All

or None" principle. On the contrary, a skeletal muscle, when similarly treated, gives contractions approximately in proportion to the stimulation applied to it. If we assume that, in the latter case, every fiber in the muscle responds to every stimulus, we are confronted with the problem of explaining the mechanism of such graded responses, particularly of explaining their differentiation from the total response of cardiac muscle. Stiles calls attention to the work of the English physiologist, Lucas, who has contributed evidence to show that the individual fiber of a striated muscle obeys the "All or None" principle. If this be taken as conclusively demonstrated, a number of interesting consequences follow, especially with regard to the nature of neuro-muscular response. Thus, "*a muscle is really a musculature* with no necessary unity of functioning parts," while its central representation is probably multiple and diffuse. Applied to improvement gained in strength by training, this notion of the fractional use of muscles would attribute this improvement to the acquisition of control over more and more fibers,—either by increased command over cortical motor cells, by extension of synaptic diffusion at lower levels, or by increased facility of end-plate transmission. Yet again, improvement may be due in part to the development of new reflexes. If, say, one-half the fibers of a given muscle are directly stimulated from the cortex, while the remaining fibers can be reached only by reflex excitation from the cord, practice may facilitate the activity of this auxiliary reflex action. The athlete is trained, then, to command extended innervation as well as to secure superior co-ordination.

In a similar manner, the postponement of fatigue through interest in an occupation, or the extraordinarily powerful contractions observed in delirium, hypnosis, strong emotional excitement or in other unusual conditions are readily intelligible if we suppose that the ordinary, 'normal' contraction involves only a fraction of the total number of fibers, whereas the exceptional contractions just mentioned bring into play many fibers ordinarily unstimulated.

To the reviewer it seems that these considerations, speculative as they admittedly are, suggest principles of explanation that might be applied in the discussion of the belief of James and other writers who contend that every individual can train himself, by tapping normally unused "levels of energy," greatly to augment his psychophysical efficiency.

JOHN FRANCIS.

## NOTES AND NEWS.

The Pedagogical Society of Brussels has organized a section for "Psychological Child Study." The director of the section, Dr. I. Ioteyko, editor of the *Revue Psychologique*, outlines the following program of investigation: (1) Development of children's aptitudes. (2) What aptitudes are necessary for different branches of instruction? Is there any correlation between aptitudes? (3) The classification of intellectual types. (4) The determination of the chief bodily measurements for Belgian children. (5) A study of right and left handedness. (6) Children's ideas of utility. (7) Development of the feeling of justice and injustice with age. (8) The development of taste in children. (9) Children's opinions as to the degree of difficulty of school subjects. (10) Physical pain in children.

The Hantsworth (England) Education Committee, according to the *Westminster Gazette*, is grappling very effectively with the problem of intermediate industrial education. It employs a special visitor whose business it is to interview the parents of every child leaving the elementary schools, ascertain the occupation which the child is going to take up, and point out courses in technical schools which will be of assistance in that occupation. The committee is contemplating the establishment of a juvenile labor bureau, and such co-operation with existing labor exchanges as to ensure the steady and permanent advance of the pupils in their life work. "We are catching the boys and girls in the most critical period of adolescence and are making them see the importance of following up their ordinary school work by a course of proper advanced instruction."

In his presidential address on "Nature and Nurture" before the Social and Political Education League, Professor Karl Pearson, according to *Nature*, laid stress on the necessity for exact methods in the study of sociological problems, and indicated the difficulty of analyzing the resultant effects of nature and nurture so as to exhibit the relative importance of each factor. A few pedigrees were given, illustrating the appalling extent to which abnormalities may be propagated by a fertile



degenerate stock, and, conversely, the persistence of intellectual eminence in superior stocks. Further, the strength of nature was contrasted with that of nurture by two tables—the first showing correlations between parent and offspring or between members of the same family, the second, correlations between various factors taken as indices of environment and physical characteristics of children. Professor Pearson concludes that “there is no real comparison between nature and nurture; it is essentially the man who makes his environment and not the environment which makes the man.” The address has been published in the *Eugenics Laboratory Lecture Series*.

Mr. David Heron has recently published in the *Eugenics Laboratory Memoirs*, VIII, (Dulau & Co., 4s), an investigation on “The Influence of Defective Physique and Unfavorable Home Environment on the Intelligence of School Children.” Mr. Heron concludes that there is little sensible effect of nurture, environment and physique on intelligence, that while unfavorable home environment and physique may make some contribution to the degree of intelligence it will be found to be a “second order” contribution, possibly even an indirect effect of race and stock, the abler children being those of fitter parents who give them better homes and better physique, and that there is no sign of an environmental condition producing an effect at all comparable with the known influence of heredity.

Among the addresses delivered at the meeting of the Association of German Scientific Men and Physicians, Königsberg, September 18, was one by Professor Craemer, of Göttingen, on “Puberty and the School.”

It is announced that a national office of French universities and schools has been inaugurated under the presidency of M. Paul Deschanel, of the French Academy. The new department is to be installed at the Sorbonne, and its object will be to make known to foreigners the educational resources of France.—*Science*.

At the recent third Hochschultag of Germany, Professor Lamprecht, of Leipzig, the most famous historian in the academic world of the Fatherland, delivered an address which is causing an endless discussion by the claim that the German universities no longer occupy that pre-eminence in higher education that they have for decades, but are being outranked by other institutions, particularly by those of America, on account of their great financial equipment and excellent management.

Lamprecht finds the student body in the Fatherland more modern than the teaching corps, as is evinced particularly by the fact that the former no longer crowd the regular university lectures, but enthusiastically take part in the work of the institutes and seminaries.—*Independent*.

In the Education number of the *Independent* Mr. Edwin Ginn, head of the firm of Ginn & Co., defends the school book publisher against the attacks that are being made upon him. "The publisher of school books is a public servant, and the public should see to it that no action on their part seriously hampers him in his work or hinders from entering this field men of intelligence and enterprise." Dr. Thomas Stockham Baker, arguing the case of "Boarding Schools vs. Public Schools," points out that a "weakness of the public schools consists in the lack of a stable educational policy. Many theories, many fads, are tried whose permanent value has not been fully determined. There is a good deal of educational vivisection taking place, which is not only unfortunate for the pupils, but which also produces no results except of a negative character." Contrasting the resulting product of such conditions with the pupils of German schools, he says, "before entering the university the German lad has received the kind of drill which will control his entire career. He has learned the inviolability of scientific accuracy. He has acquired that power of attention to details which has made German scientific work exhaustive and thorough. Above all, he has amassed an amount of information which would stagger the ordinary American boy."

A bill "to require that in public elementary schools instruction shall be given in hygiene, and to girls in the care and feeding of infants," was introduced in the House of Commons (England), on July 19, and read for the first time.—*Nature*.

The Education Committee of the London County Council is about to open an experimental school for tuberculous children. The building will be surrounded by large grounds, and the pupils will be under constant medical observation. The city of Genoa has also established an open-air school for tuberculous children in the suburb of San Gottardo, with free transportation from the center of the city, and three meals a day.

We note the publication of a new Italian monthly periodical, *L'Igiene della Scuola*, devoted to the interests of school hygiene. The journal

presents a very attractive appearance and contains original articles, reviews of books, notes, bibliography and abstracts of periodical literature. It is edited by Dr. Mario Ragazzi, with the assistance of an imposing list of Italian collaborators, and is published at Genoa, via Balbi, 15. The foreign subscription for the annual volume of about 400 pages is 12 Lire.

To those who are interested in the medical inspection of schools we commend the recently issued annual report for 1908 of the Chief Medical Officer of the Board of Education (London: Eyre and Spottiswoode, 1910. Pp. 170. Price, 8½d.). The report traces briefly the history of the inspection movement in England and on the Continent, and gives a detailed account of the change during the last three years from no inspection at all to the vast system now operative over the length and breadth of England.

The August bulletin of the Massachusetts State Board of Health calls attention to the new regulation whereby on and after October 1, 1910, it will be unlawful to provide a common drinking cup in any park, street, hotel, theatre, school, railroad station, car, or other public place. Such negative legislation, while well meant, will be of little avail unless provision is made for the establishment of automatic drinking fountains. The schools should here set the pace.

The August number of *School Hygiene* (London) contains several interesting notes on dental hygiene. Mr. Cyril Jackson, speaking at the opening of a school clinic at Deptford, said that the London County Council would willingly help in the dental clinic, for the teeth of school children in London were deplorably bad. It is an absolute necessity that parents should see to the cleanliness of children's teeth, and he pointed out that the dangerous time, when decay was liable to set in, was that just before the growth of the second teeth. The London County Council has concluded that inspection is of no use whatever without treatment. Mr. Gant has a brief report on dental treatment at Cambridge, and there are extracts from Mr. Blair's report on the measures adopted in Germany for the care of children's teeth.

The Italian sub-committee on juvenile delinquency has drawn up a bill for the control of moving-picture performances. It provides for a licensing system and a tax on all films which are not educational, and prohibits the attendance of children under twelve unless accompanied

by their parents or guardians. In Berlin the Chief of Police has forbidden, under pain of severe penalties, the admission of children under fourteen, whether accompanied or not, to moving pictures after 9 o'clock in the evening.

The National Association for the Study and Education of Exceptional Children, Plainfield, N. J., has issued its fifth annual report. The association confines its efforts to that class of children between feeble-minded and normal, which are sometimes referred to as atypical or nervous. It is carrying on an active campaign for the sale of "Scholarship Fund" stamps, in order to enlarge the scope of its work and interest as many as possible in its problems.

According to a recent bulletin the first international congress of paidology will be held in Belgium at some time in the month of August or September, 1911. Dr. V. Desguin will serve as honorary president, Dr. O. Decroly, active president, Dr. I. Ioteyko, 35 Ave. Paul de Jaer, Brussels, secretary, and M. Th. Daumers, 11 Place Anneessens, Brussels, treasurer. The member of the executive committee for the United States is Professor J. McKeen Cattell, Columbia University.

The second international congress of primary education was held in Paris, August 4-7, 1910. Among the subjects discussed were the results of compulsory education in different countries and the means to be taken to make it more effective; the aim of elementary science in the primary schools; the professional preparation of teachers, inspectors and administrators of public primary education; and continuation schools, public and private.

We learn from the *Rivista Pedagogica* that the National Association for Pedagogical Studies (Italian) has voted to issue a call for an international pedagogical congress to be held at Rome in 1911.

Dr. Robert J. Aley, state superintendent of education in Indiana, has been called to the presidency of the University of Maine.

Dr. Colin A. Scott, head of the department of psychology and education, Boston Normal School, has accepted a call to the chair of psychology and education in Jackson College, the newly established college for women which supercedes the woman's department of Tufts College.

## PUBLICATIONS RECEIVED TO SEPTEMBER 1, 1910.

W. M. BECHTEREW. *La suggestion et son rôle dans la vie sociale*. Traduit et adapté du Russe par Dr. P. Kéval. Paris: Ch. Boulangé. 1910. Pp. 276. 4 fr.

In 34 chapters the author considers the nature of suggestion, its relation to dreams and hallucinations, its application to epidemics of crime, suicide and religious emotion, its role in crowds, mobs and panics, and the part it plays in normal social life. Such a work from the pen of one of the world's most famous neurologists is sure to attract much attention.

*L'Année psychologique (seizième année)*, edited by ALFRED BINET with several collaborators. Paris: Masson et Cie., 1910. Pp. x, 500. 15 fr.

In this, the sixteenth volume of the French 'year book' of psychology, 113 pages are given over to reviews of books and articles pertaining to the most varied phases of psychology. The remainder comprises a bird's-eye view of the progress of psychology in 1909, and a series of original articles. Of these Binet and Simon contribute eight dealing with the chief forms of mental pathology, Bourdon one upon tachistoscopy, and Binet one upon the psychology of testimony, one upon Rembrandt and one upon the physical signs of intelligence in children. The last named article will be reviewed later.

J. MILNE BRAMWELL. *Hypnotism and Treatment by Suggestion*. New York: Funk and Wagnalls, 1909. Pp. 216.

Dr. Bramwell's book is fairly characterized by his statement in the preface: "I have attempted to deal fully and clearly with all practical points, especially the methods of employing suggestion, the causes which influence suggestibility and the class of cases suitable for this form of treatment."

JOHN DEWEY. *How We Think*. Boston: D. C. Heath & Co., 1910. Pp. 224.

The author contends that there is too much multiplication of studies and principles in our schools. Children learn many things, but only incidentally do they learn to think. How can they be taught to think? This question is answered first, by a consideration of the problem of training thought in relation to school conditions; second, by the logical analysis of the thought process, and third, by a detailed examination of school activities which may be utilized in thought training. The book will receive further discussion.

FRANCES GULICK JEWETT. *Good Health*. Boston: Ginn & Co. Pp. 174. 40 cents.

CHARLOTTE VETTER GULICK. *Emergencies*. Pp. xiv, 174. 40 cents.

FRANCES GULICK JEWETT. *Town and City*. Pp. 272. 50 cents. *The Body at Work*. Pp. 247. 50 cents. *Control of Mind and Body*. Pp. 267. 50 cents.

These five texts, edited by Dr. L. H. Gulick, constitute the Gulick Hygiene Series, and are intended for use in the elementary schools. To the many teachers who have been disheartened by the apathy with which pupils receive instruction in the vitally important matters of physiology and hygiene, this series of books will prove a veritable god-send. The texts are well written and attractively printed and illustrated.

*The Mendel Journal*. (Published for The Mendel Society, by Taylor, Garnett, Evans & Co., London.) No 1, October, 1909. Pp. 216. Price, 2/6 net.

Mendelism is unquestionably a subject that has not only great academic, but also great practical importance. The promoters of this new journal plan to meet both phases, to gather facts concerning human pedigrees and the inheritance of normal or peculiar traits and to ensure their discussion, and also to print advice concerning agricultural and horticultural practices and problems. The first issue is decidedly attractive and interesting.

PROF. DR. OSKAR MESSMER. *Lehrbuch der Psychologie für werdende und fertige Lehrer*. Leipzig: Julius Klinkhardt, 1909. Imported by G. E. Stechert, N. Y. Pp. 331. M. 3.60. Geb. M. 4.20.

This is a textbook of psychology for teachers based on modern experimental investigations, and with it the author hopes to help abolish the all-too prevalent German practice of teaching psychology by the aid of illustrations drawn from poetry. The book is in three sections: (1) sensations, under which Messmer includes not merely sensations proper, but perception in all its aspects; (2) sensations (perceptions) in relation to attention, including both its subjective and objective factors; (3) sensations in relation to the will and the emotions. The work is richly illustrated with diagrams and cuts, and shows a more careful division into sections and paragraphs and greater attention to the emphasis of important statements than one usually finds in a German psychological text. A more detailed notice will follow.

G. E. PARTRIDGE, PH.D. *An Outline of Individual Study*. New York: The Sturgis & Walton Co., 1910. Pp. 240. \$1.25 net.

The outline consists of three parts (1) the history and theory of individual study, (2) practical study of individuals, (3) application to the study of two individuals. The author has made an interesting attempt to simplify and popularize the results of recent psychological in-

vestigations, and gives a large number of simple tests which can be used by the ordinary teacher in the class room. We shall return to the book later.

HENRI PIERON. *L'évolution de la mémoire*. Paris: Ernest Flammarion, 1910. Pp. 360. 3.50 fr.

After an introductory survey of the subject of persistence from inorganic substances to human memory, the author discusses rhythmic persistence in plants and animals, devotes over 200 pages to experimental studies of memory and habit formation in animals and 100 pages to human memory. The latter he considers chiefly as a biological and social phenomenon. This is an important work, which should be in the hands of all those interested in the development of mind. It will be reviewed later in this journal.

*Proceedings of the Exercises and Conferences of the National Association for the Study and Education of Exceptional Children*. Plainfield, N. J., 1910. Pp. vii, 141. \$1.50.

This volume contains the papers and addresses presented at the conferences held in the Assembly Hall of New York University, April 21 and 22, 1910, on the occasion of the tenth anniversary of the Groszman School for Nervous and Atypical Children. The general topic was "The Exceptional Child," and various aspects of the topic were discussed by 17 prominent physicians and educators. Many of the medical papers contain interesting and important observations.

*The Psychological Index* (No. 16, Index for the year 1909.) Compiled by C. L. VAUGHAN and KNIGHT DUNLAP. Baltimore: The Review Publishing Company, 1910. Pp. 211. \$1.00.

TH. RIBOT. *Problèmes de psychologie affective*. Paris: F. Alcan, 1910. Imported by G. E. Stechert, New York. Pp. 172. 2.50 fr.

The following topics are treated: Affective consciousness, affective memory, antipathy, the nature of pleasure and a form of affective illusion. The author defends the view that affective consciousness is totally different from and genetically prior to cognitive consciousness; likewise that affective memory is independent of cognitive memory.

M. E. SADLER, Editor. *Moral Instruction and Training in Schools*. 2 volumes. London and New York: Longmans, Green & Co., 1909. Volume I. *The United Kingdom*. Pp. lviii, 538. Volume II. *Foreign and Colonial*. Pp. xxvii, 378. Each volume 5s. net.

An authoritative compilation of what is being done in the way of moral instruction in schools. A detailed review will appear later.

FREDERICK TRACY, B. A., PH. D., and JOSEPH STIMPFL, PH. D. *The Psychology of Childhood*. Boston: D. C. Heath & Co., 1909. Pp. x., 219.

This, the seventh English edition of this well-known book, corresponds to the second German edition, which appeared in 1908. The essential modification of the treatment consists in the discussion in the earlier chapters of elementary disorders of the child's mental life, and the addition of a new chapter, by the German author, upon the more complicated psychopathic conditions in child life. The topics treated are mania, melancholia, paranoia, imbecility, neurasthenia, hysteria and epilepsy.

ELSE WENTSCHER. *Der Wille. Versuch einer psychologischen Analyse*. Leipzig: B. G. Teubner, 1910. Pp. 189. M. 2.40. Geb. M. 2.80.

A philosophical discussion on the nature of the will, based on what might be called naive introspection. The explanations of Ebbinghaus and Münsterberg are rejected on the ground that the act of volition is therein reduced to a mere matter of association of ideas. Meumann's view is likewise too intellectualistic. The author agrees with Wundt in considering will an emotional phenomenon. Those educators who are fond of talking about the importance of training the feelings will doubtless find much in the book to their liking.

ARTHUR WHITELEGGE, C. B., M. D., etc., and GEORGE NEWMAN, M. D., D. P. H., F. R. S. E. *Hygiene and Public Health*. New York: Funk & Wagnalls Company, 1910. (New and revised edition.) Pp. 650. \$1.75 net.

A manual intended to provide a concise summary of the current knowledge concerning public health, written primarily for the use of health officers and with English conditions in mind. Its 21 chapters cover such topics as food, water, soil, hospitals, infection and disinfection, diseases, sanitary legislation and vital statistics. The chapter on schools and school hygiene, 19 pages, is not especially to be commended; it contains numerous statements that are not in accord with the opinions of the best authorities on school hygiene. The book infringes most of the rules of hygienic printing.

FREDERICK HOWARD WINES, LL. D. *Punishment and Reformation: a Study of the Penitentiary System*. (New, enlarged edition.) New York: Thomas Y. Crowell & Co., 1910. Pp. 387. \$1.75 net.

This book is recognized as the most important contribution in American literature to the discussion of the reformatory system. It constitutes an extended argument in favor of the "indeterminate" sentence. Further notice will follow.



## PSYCHO-ANALYSIS AND EDUCATION.

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It is to be expected that the laborious investigations carried out by means of psycho-analysis would lead to conclusions of great import regarding the subject of education, for in the first place they have to deal with the deepest problems of character-formation, conduct, feeling, and motive, and in the second they lay especial stress on the significance for all later mental life of childhood experiences and tendencies. This expectation is, however, only partly justified in fact, for at the outset it must be said that up to the present psycho-analysis has not revealed a great deal of importance from the point of view of education properly so called, that is, of the artificial training, developing, and *positive* drawing out of various capacities and functions. The reason for this lies in the fact that those who have worked with the method have as a rule become trained in skepticism and caution, and prefer not to draw conclusions until these are based on an adequate system of evidence; they have been able to determine that the psychological problems of education are fraught with more complex difficulties than many writers on the subject suspect, but these problems have rarely lain sufficiently in the path of psycho-analytic research to render them so far capable of solution. On the other hand, psycho-analysis has a number of conclusions to enunciate on the more important *negative* side of the subject, namely, as to the nature and harmful effects of faulty education; the reasons why this aspect is more important than the other may perhaps become plainer towards the close of the present paper.

We should begin by shortly considering psycho-analysis itself, with some of its teachings, but the psychology of the matter-in-hand is so technical and complex, and the range of subjects over which the method has found application so extensive, that it is impossible here to do more than give a most summary indication of a few of the conclusions reached that are cognate to the present topic.

These conclusions are all due to the painstaking investigations of the originator of psycho-analysis, Professor Freud of Vienna, though they have since been confirmed by a number of other workers, myself included; the following account is based on Freud's writings, to which, therefore, it will not be necessary for me to refer in detail. Of the method itself nothing need be said except that it is a special means for penetrating into the deeper and less accessible layers of the mind, which form the basis for the more superficial structures that are later acquired. This static metaphor is in itself a misleading one, for psycho-analysts come essentially to regard the mind from a dynamic point of view, as being composed of a series of desires, trends, wishes and ambitions which are constantly striving to find expression and gratification. Desire, in the broadest sense of the word, is the fundamental driving force of all mental activities, and is behind not only our external conduct and functionings, but also our interests, attentions and even capacities, or at all events the extent to which these latter can be developed and manifested. These trends and desires are not isolated functions in the mind, but often are intimately connected one with another. A desire that is for any reason thwarted therefore tends to reach expression by reinforcing an associated desire, so that they find a common outlet. This occurrence is so frequent that it may be said that the majority of our actions are determined not by a single motive, but by several; for a reason that will presently be pointed out, however, the subject is usually able to recognise only the most superficial or accessible of these, so that he has but a limited extent of actual self-knowledge. Further, a desire that arises

in a person's mind for the first time is not likely to be very effective or significant unless it becomes attached to others that are already present; in other words, a motive appeals more readily to him if it is linked, by resemblance, to earlier ones that are already operative with him. A simple illustration of this is the fact that, other things being equal, such a movement as the one to abolish capital punishment is more likely to appeal to a man who has previously been distinguished by humanitarian tendencies than to a man whose official duties have caused him to be largely occupied with the infliction of suffering, as so many legal functionaries are. It follows that in the acquirement of a new motive or interest potentialities already present play an important part. This is fairly obvious, at least in the abstract, so far as quite new and strange functions are concerned, but psycho-analysis has shown that the same considerations apply much more extensively than had previously been thought probable to even more stable and integral functions. The surface motive for an act or an interest is rarely the complete explanation that it appears, and provides only some of the operative energy; more of this energy, and often the greater part, arises from deeper, associated trends from which it has been transferred, as it were, to the surface one. Mental life is thus seen to constitute a connected chain of activities. Theoretically one must suppose that its continuity is perfectly even, and practically one can, by means of psycho-analysis, demonstrate this to a very considerable extent. The appearance of discontinuity that it commonly presents is simply due to the failure to recognize anything more than the surface tendencies. Frequently the deeper ones, which fill in the apparent gap in continuity, are inaccessible to direct introspection, that is, they are unconscious, and can be reached only by means of special investigation. Attention must again be called to the fact that knowledge of these unconscious trends explains not only actions that otherwise are regarded as unintelligible or as "causeless" and accidental, but also many important features of quite normal behaviour.

A corollary that follows from these considerations is that the older in the life of the individual is a given tendency or desire the more significant is it apt to be, for it not only has equal value with those acquired later, but plays a considerable part in determining which later ones will be acquired, and with what intensity. Indeed, the history of any later mental activity is not fully known until it has been traced back through childhood to some constituent of instinctive mental life. The inherited instincts, or the environmental modifications of these, are thus seen to constitute the ultimate basis of all mental life. The objection naturally raised to this conclusion, that the earlier desires fade and in time lose their intensity—being replaced by others that are totally disconnected—contains the fallacy that it assumes a discontinuity which does not exist; this can be shown by psycho-analysis, and hitherto in no other way. The objection is further founded on ignorance of the facts that the deepest and most primary desires are unconscious, and that the most striking characteristic of unconscious desires is their capacity to retain their activity for truly astonishing, and almost unlimited, periods.

Experience teaches that when later interests, desires, and ambitions are traced to their origin far more of them than are commonly thought are found to arise in the psycho-sexual instincts. (The term sexual is here used to denote not only tendencies directly concerned with the reproductive act, but also all those indirectly concerned, including the maternal instinct, various pleasurable sensations and activities, such as masturbation or other forms of auto-erotism, and so on). This really follows from the view that mental life is evolved, in the individual, from the inborn instincts; for of all these the sexual ones are the most fundamentally important, certainly from the point of view of the mind; it is the manifold richness of his sexual life that biologically most distinguishes man from the lower animals.

We come lastly to the conclusions of psycho-analytic investigations on the mental life of the child, and these are in them-

selves so extensive that they can here be described in only the most general way. The child comes to the world endowed with a number of natural instincts, the mental aspects of which are at first by no means prominent. When these develop they are essentially shown in a search for the repetition of once-experienced pleasurable sensations, first those of taste and touch, later those of sight, smell and hearing. After a variable number of months education of the child begins, and this is from the first of a double nature. On the one hand he is weaned to interests outside of himself, such as the recognition of various people and objects, and on the other hand he is weaned away from certain egocentric interests, such as his demand to satisfy his instinctive bodily needs (hunger etc.) regardless of time and place. Thus at an early age begins that conflict between social and purely personal considerations, on the satisfactory resolution of which largely depends the success of education in its broadest sense. As the years go by the child finds that he has to renounce more and more of his immediately personal interests, which he must learn to replace by external social ones. The sacrifice in this way demanded is much more considerable than is commonly supposed, for psycho-analysis has established that in the first four years of life the child is far more preoccupied than is generally thought with matters from which his interest has to be weaned. Before the ban of social pressure has come to exert its full force his attention is attracted by excretory acts and products, by vaguely pleasurable sensations situate in the parts of the body concerned in these, and later by problems and curiosities on all sorts of forbidden topics—the difference between the sexes, the relations between the parents, the origin of children, and so on. The extent to which such matters occupy the mind of the young child is always underestimated by adults and is impossible to determine by a casual examination, for on the one hand the later memories for those years are always both deficient and erroneous, and on the other hand this aspect of the child's mind is rarely accessible to direct

enquiry, on account of the barrier always existing on the subject between child and adult. As the child grows older, the desires and tendencies in question meet with such obstacles as an increasing sense of shame, guilt, wrongness, remorse, and so on, and are fought against by the child, who now half-consciously strives to get away from them, to forget them, or, as it is technically termed, to "repress" them. These repressed mental processes are later thus forgotten, and along with them a major part of all the mental experiences associated with them in time; this is the reason why so little of early childhood life can be recalled by the adult.

The desires, thoughts, impulses, tendencies and wishes thus repressed do not, however, die; they live on, but come to expression in other forms. Their energy is directed along more useful paths, a process known as "sublimation," and upon the extent and kind of this sublimation depends a great deal of the future interests and activities of the individual. To take a simple example: the impulse proudly to display the body, and especially certain parts thereof, which is pronounced with some children, may later be manifested in such ways as an undue predilection for certain toilettes, for instance, openwork blouses, clockwork stockings, or startling waistcoats, or, on a higher plane, by the desire to shine before an audience, to be the centre of general attention and admiration, and so on. In fact it may be said that a very great part of our social and cultural activities are sublimated forms of "natural," instinctive tendencies which have in the course of education become repressed into the unconscious, and thus forgotten.

It must not be thought, however, that this renouncement of instinctive tendencies in favor of less personal ones is always carried out so smoothly and successfully as has just been indicated. In many cases, perhaps in most, the conflict due to the encroachment on the child's personal liberties is resolved only at a considerable cost to his later usefulness as a citizen. There are three other possibilities open besides that of sublimation.

In the first place, the tendency may be too strong to be repressed, or it may become too strong if certain errors in upbringing are committed, and in this case it may reappear in the adult as a sexual perversion; this is the least frequent possibility, but it is by no means a rare one. In the second place, the repressing force may not altogether fail, as in the last instance, nor altogether succeed, as in the process of sublimation; instead, a compromise is reached between the opposing tendencies, in which the repressed wish is manifested, not openly in a sexual perversion, but in an indirect, disguised form. It then forms a nervous symptom, so that the symptoms of the psycho-neuroses, hysteria, obsessions, etc., may be said to be the negative of the perversions<sup>1</sup>. When we recall the exceeding prevalence of these conditions, and of certain forms of insanity which arise in a similar way, we see that errors of development in early childhood life are the rule rather than the exception. It may be added that a number of "bad habits" frequently met with during school life, such as nail-biting, bed-wetting, certain facial twitches (tics), attacks of ill temper, etc., have a similar origin, and are often the precursors of more serious troubles in later life. In the third place, the child may react to the tendency, which is being repressed, by proceeding to the opposite extreme, an occurrence known as excessive reaction-formation. Of this group the following are examples: an over-sensitiveness to the sight of suffering, which may render the spectacle of life an intolerable nightmare; a morbidly harsh and bigoted austerity, sometimes unfortunately misnamed "Puritanism," which narrow-mindedly sees evil in the most innocent enjoyments of life, and is unrelenting in its cruel severity towards human frailties; an exaggerated sense of shame, which martyrs the individual as he passes by some of the necessary aspects of life; a passion

<sup>1</sup> See A. A. Brill, Freud's Conception of the Psycho-neuroses. *Med. Record*, Dec. 25, 1909, and Ernest Jones, A Modern Conception of the Psycho-neuroses. *Interstate Med. Journal*, August, 1910.

for household cleanliness and orderliness that makes all domestic comfort impossible. Many more could be added to the list, but only one other will be mentioned, and that on account of its extreme social importance. This is the excessive attitude of shame or even disgust towards matters of sex in general, an attitude that culminates in the bizarre whimsies of certain fanatical sects, such as the Russian Skoptecs, or of the present New England movement in favour of "ethical marriages." From it results, among other things, a morbid dread of maternity, a degradation of the conception of this function—turning the most important stage of it into a secret shame—and an incompatibility for the most essential marital relations (it has been stated that forty per cent. of all civilised women are anæsthetic in this regard, an estimate that cannot be very far wrong). A man or woman burdened with this reaction-formation is taking a dangerous step in entering marriage, for the possibilities of future unhappiness and even misery resulting under such circumstances are only too great.

From the foregoing it will be seen that, according to the findings of psycho-analysis, the sexual life of children is much richer, both physically and mentally, than is generally believed, and that the manner of its development is of decisive importance for the whole life history of the individual. It is of course obvious that it widely differs from that of adults, in what precise respects need not here be considered. One matter must, however, be mentioned, namely, that the early relations of the child to the people with whom he is brought into close contact, therefore above all to the members of his own family, are frequently, if not regularly, tinged with eroticism. These early and dim incestuous thoughts and sensations are of dominating significance for later relationships, friendships, marriage, etc., and there is no more important part of the child's mental growth than the overcoming of them.<sup>2</sup> To state

<sup>2</sup> Some aspects of this subject have been discussed in an article published in the *Amer. Journ. of Psychol.*, Jan., 1910.



this more generally: an essential stage in the satisfactory development of the individual's capacities and activities consists in gradually freeing himself from family ties, and in his replacing dependence on the parent by a sense of personal responsibility and self-direction. Too often this stage is only incompletely passed through, to the great detriment of the person's individuality. A high level of ethical responsibility is only possible through the child's learning to be self-reliant, and to recognise the desirability in forming his decisions of giving heed to his own knowledge and conviction as to what is right, as well as to the traditions he has blindly adopted from his parents. It must further be repeated that the bond by which a conservative dependence on one or other parent is maintained, and which often defies all reason and common sense, frequently arises in a sexual attraction dating from early childhood, of which the subject is completely unconscious.

If we now briefly summarise those of the foregoing conclusions that have the most direct bearing on the subject of education they may be stated as follows: Mental life should be regarded in a dynamic way, as a stream of desires and interests that tend to seek gratification. New desires and interests are not independent occurrences, but largely depend for their intensity, or even their existence, on older trends. The direction taken by the oldest of these, namely those of early childhood life, is of predominant importance for the whole future of the individual. The driving forces of mental life, therefore, are ultimately derived from the primary instincts, and can never be independent of them. It follows that satisfactory mental functioning is best attained by inducing a harmony between the different components of the mind. Many of these, particularly early in life, are of such a kind as to be unacceptable to the standards of modern civilisation, and have to be suppressed, or, rather, transformed into others of greater social value. In this process some become "repressed" and are driven into the unconscious; they however

retain their power, for good or evil, and the latter is often only lost when they are again made conscious, as in the psycho-analytic method of treatment. Stress must be laid on the facts that repression is a delicate process which under certain circumstances may bring with it grave consequences to the individual, and that filial piety, if carried to excess, is also not without seriously detrimental results.

We have next to notice some of the lessons that may be learned from these considerations. The chief of them is that the main task of education should be not the mere addition of something, e.g. knowledge, to the child, but the ordering of the influences that act on him, in such a way as to allow the freest scope possible for the development of those capacities that will make him a useful citizen in the broadest sense of the word. Several corollaries follow from this, which reflect unfavourably on our present educational methods.

In the first place, in order to obtain the best results it is necessary to make education a more individual matter than it is at present. Teaching by rote large numbers of children in exactly the same way is based on the antiquated and erroneous view that the aim should be the acquirement by the pupil of a uniform standard of knowledge, whereas it should rather be the education, or drawing out, of his special potentialities. That the endeavour to fit every child to a preconceived pattern, instead of bringing about a free development of his latent qualities, is necessarily grievous, is strikingly pointed out by a sentence of Bernard Shaw's: "The vilest abortionist is he who attempts to mould a child's character." This comment applies even more forcibly to the general upbringing of a child than to the narrower question of teaching. It will have to be recognised in the future that the transformation of primitive, egocentric activities into those of a social order is a process that cannot be carried on with all children by the same means, or to the same extent. There is a limit to which this

transformation is possible, and any attempt to force it beyond this must defeat its own object by bringing about results, e.g. neuroses, which greatly impair the social usefulness of the person in question. As to the means, the most important point to bear in mind is that success is best achieved by gradually weaning the child to social interests, and not by merely forcibly suppressing and forbidding the primitive ones without replacing them by others. If the latter is the course pursued then the likelihood is great that they will continue to act unconsciously and produce unfortunate results. The same remark applies to unacceptable desires or interests that may arise in later life. The way to deprive these of their power for harm is not to shun them, to get away from them, to "repress" them, but manfully to face them, to "get square" with them, and to settle them one way or the other. As Blake said over a century ago, "Sooner murder an infant in its cradle than nurse unacted desires."

In the second place, it is desirable that education should concern itself more than hitherto with what may be called the human side of the child, and not exclusively with the intellectual. This applies to the school as well as to the home, though, as this paper refers to education in the broader sense, other influences than those of the school must also be considered. Prominent in the present respect is the much-discussed question of sexual enlightenment, and, as psycho-analysis shows the unsuspected significance of the child's sexual development for later years, a little must now be said about this. The general arguments for the necessity of this course being adopted have so often been cogently presented that I shall here confine myself to mentioning some of the respects in which they may be reinforced by the conclusions of psycho-analysis. Any one who still has any doubt left on the matter is recommended to read the second chapter of Dr. Havelock Ellis' "Sex in Relation to Society"—an excellent volume that

should be in the hands of every teacher, and indeed of every thoughtful citizen; a number of useful books on the subject are there cited.

It has repeatedly been pointed out of late years, and nowhere more effectively than on the side of the Church, that it is impracticable to hope that a child will long retain his ignorance as regards sexual matters, and that, as the sources from which he will draw his information are only too likely to be impure, it is safer deliberately to implant a healthy knowledge in his mind which will prevent him from being evilly influenced later on. It is really hardly possible for a normal child to avoid drawing inferences from the experiences he meets with on all sides, his own sensations, the witnessing of domestic animals, the birth of younger children, the manifold indirect hints in the conversations of his elders, the still broader ones in what he reads—even in the Bible itself, the talks of older comrades or of licentious servants, and so on; whoever denies this certainly underestimates both the intelligence and the natural curiosity of children. It has been urged that it is unnecessary to do more than leave this process of enlightenment to take its own course, but, as Ellis puts it, "this is as much as to say that there is no need to supply sources of pure water when there are puddles in the street that anyone can drink of." The present argument is strongly confirmed by the facts disclosed by psycho-analysis, namely that actual sexual experiences and speculation on the topics of sex regularly occur in early childhood—before the age of five—and are from the very nature of the child's mind unavoidable; when direct information is denied him, as is usually the case, he invents various explanations, which frequently contain a curious modicum of truth. These are usually forgotten, but it can often be shown that they exert a profound influence not only on his later attitude towards the subject, but also on his whole character. A child rarely accepts the false explanations given by his parents, who underestimate his in-

telligence; he usually deceives them into thinking he does, and after the age of five or six, when he has forgotten his own explanations, he may deceive himself. It must further be pointed out that the customary endeavour to keep the child's mind a blank on the subject is far from being a negative one, as parents commonly maintain; the organised conspiracy of silence is soon noticed by the child, and he is subjected to a mass of suggestion, all the more potent for being indirect, which teaches him that the subject is taboo, mysterious, improper, peculiar, and essentially wicked. Those who object to direct enlightenment, therefore, should recognise that they are really defending a false enlightenment, a positive teaching of shame and guilt.

Another argument that has been frequently advanced, especially by members of the medical profession, is that ignorance of the basal facts of sex is the worst preparation for the state of marriage. Every doctor must have met with instances of bizarre ignorance and misapprehensions in this direction, and is aware of what suffering in married life they may cause. There is no doubt that, whatever may be said about children, it is frequently necessary, and always desirable, for men and women of a marriageable age to receive instruction concerning the physiology and hygiene of sexual life. The importance of training girls in domestic economy and household management is becoming generally recognised, in view of the fact that this is likely to form one of their main duties in life. It is even more needful that they should be educated in other, intimate matters, on which their future efficiency and happiness may largely depend; such education is by no means to be limited to the care of children, important a subject as this may be. Ellis has a valuable section on this matter in the book previously referred to (Chapter XI), where he writes<sup>3</sup>: "Girls are educated with the vague idea

<sup>3</sup>Op. cit., p. 52.

that they will marry,—quite correctly, for the majority of them do marry,—but the idea that they must be educated for the career that will naturally fall to their lot is an idea which as yet has never seemed to occur to the teachers of girls \* \* \* Women are trained for nearly every avocation under the sun; for the supreme avocation of wifehood and motherhood they are never trained at all!” Psycho-analysis has furnished an important contribution to this matter through the disclosure that not only the ignorance just referred to, with all its lamentable results, but also most of the frictions, unhappiness, and secret cankers that mar so many married lives, and turn a great number of them into hideous purgatories, are due to defective education in early childhood. The harmful effect on later life of erroneous sexual development in these first years is incalculably great.

A third cogent argument in support of the same thesis relates to the disastrous effect on the relations between parent and child of undermining his faith in the parent on a matter that is to him of the deepest significance. I will again quote Ellis,<sup>4</sup> for no one could state it more clearly than he has done: “Even, however, if there were no other reasons against telling children fairy tales of sex instead of the real facts, there is one reason which ought to be decisive with every mother who values her influence over her child. He will very quickly discover, either by information from others or by his own natural intelligence, that the fairy-tale, that was told him in reply to a question about a simple matter of fact, was a lie. With that discovery his mother’s influence over him in all such matters vanishes for ever, for not only has a child a horror of being duped, but he is extremely sensitive about any rebuff of this kind, and never repeats what he has been made to feel was a mistake to be ashamed of. He will not trouble his mother with any more questions on this matter; he will not confide in her; he will himself learn the art of telling

<sup>4</sup>Op. cit., p. 52.

‘fairy-tales’ about sex matters. He had turned to his mother in trust, she had not responded with equal trust, and she must suffer the punishment, as Henriette Fürth puts it, of seeing ‘the love and trust of her son stolen from her by the first boy he makes friends with in the street.’ When, as sometimes happens (Moll mentions a case), a mother goes on repeating these silly stories to a boy or girl of seven who is secretly well-informed, she only degrades herself in her child’s eyes. It is this fatal mistake, so often made by mothers, which at first leads them to imagine that their children are so innocent, and in later years causes them many hours of bitterness because they realise they do not possess their children’s trust. In the matter of trust it is for the mother to take the first step; the children who do not trust their mother are, for the most part, merely remembering the lesson they learned at their mother’s knee.” The findings of psycho-analysis amply confirm these considerations also, by showing how frequent is the course of events just described. It is almost a regular occurrence for children of the age of four or five to turn from their parents, to withdraw into themselves, and to pursue private speculations about the topics concerning which they have been denied information, whether by a direct refusal or by evasion. Phantasies of bitter resentment against the parent commonly occur at this time, and often form the basis not only of a later want of confidence, or even a more or less veiled hostility, as regards the parents, but also of various subsequent disharmonies, neurotic disturbances, etc., of a kind that cannot here be described. As was mentioned above, the actual speculations and phantasies are usually repressed and forgotten, an appearance of innocence being thus produced which is deceptive to both the outsider and the child himself. The illusions most parents entertain as to the innocence of their children in such matters are well-nigh unbounded. As regards young children it is usually unshakeably strong, and with older ones it is frequently very astonishing. The fol-

lowing instance of the latter may be related, for it is by no means rare. A mother on bringing to me her nineteen year old daughter for treatment volunteered in the course of a private conversation the information that the girl had had no love affairs, and was not interested in men's society, "being too young to occupy her mind with such thoughts." It soon turned out, however, that the young lady was secretly married, and had parted from her husband on the day after the ceremony, had been the paid mistress of a number of men since the age of fifteen, had twice been infected with venereal disease, and had in her childhood indulged in the most unbridled phantasies and conduct. I have only to add that she had never been away from home, and that her mother, who was as convinced of the girl's "innocence" as of anything in life, is a quite intelligent lady, and devoted to her daughter. The case is an extreme one, to be sure, but it shows to what lengths a mutual lack of trust can be carried. All these dangers to which the girl succumbed, and a rather bad neurosis as well, might have been avoided if the mother had not blinded herself to the signs of dawning sexual life in her child, and had frankly met the desire for knowledge with judicious information and guiding.

Accepting, therefore, the need for sexual enlightenment, we turn to the more debatable problems as to how and when it should be carried out, problems that are hardly to be kept distinct, for they both raise the question of who is the proper instructor in such matters. Here again the knowledge gained by psycho-analysis dictates more negative advice than positive; that is, it has less to say about how to instruct a child than about how not to. This is fortunate, for the latter problem is much more difficult than the former; in fact, when one appreciates what dangers are to be avoided, the problem of how to instruct the child presents no serious obstacles. Of these dangers a few words will be said later; we shall first fix our attention on the positive side, and to do so it is well



to realise clearly what should be the aims of the enlightenment. Chief among these are: in the first place, to inculcate an attitude of purity and naturalness towards matters of sex, so that the child will be steeled against impure suggestions he may later encounter, and will be able to maintain high ideals in this respect; in the second place, to prepare him for the physiological occurrences inseparable from his existence, puberty, etc., and above all for the functions he will one day have to perform; in the third place, to give him such a knowledge of sexual hygiene as to enable him to guide his sexual life amidst the numerous dangers and difficulties that are likely to beset it. These three aims should be carried out principally in the order mentioned, and on the whole need to be carried out by different instructors. Enlightenment should, therefore, be brought about by a series of graduated steps, and should be adjusted to the varying needs of individual children; rule of thumb cannot replace judgment and intelligence in this sphere any more than elsewhere in education.

The first in time of these stages, and the chief in importance, is without doubt best allotted to the parent, and above all to the mother; this is one of her most grateful and responsible functions, for on the success with which she performs it may largely depend the future welfare and happiness of her children. For it she needs no technical knowledge whatever, and only one capacity—unfortunately, however, a rare one—namely, that of being able to speak to her child on the subject frankly and naturally. Dr. Allen well remarks<sup>5</sup> that “if the instructor feels any embarrassment in answering queries of the child, he is not fitted to be the teacher, for the feeling of embarrassment will, in some subtle way, communicate itself to the child, and he will experience an indefinable sense of offended delicacy which is both unnecessary and undesirable. Purification of one’s own thought is, then, the first step to-

<sup>5</sup> Mary Wood Allen, *Child-Confidence Rewarded*, p. 5.

wards teaching the truth purely." The essential thing is that, as soon as they are seriously insistent, the child's *spontaneous* questions should be answered truthfully and simply, with, of course, due regard to his capacity to understand; it is not necessary in the first few years to go beyond this and give him knowledge that he does not demand. Ellis<sup>6</sup> writes: "The child's desire for knowledge concerning the origin of himself is a perfectly natural, honest and harmless desire, so long as it is not perverted by being thwarted. A child of four may ask questions on this matter, simply and spontaneously. As soon as the questions are put, certainly as soon as they become at all insistent, they should be answered, in the same simple and spontaneous spirit, truthfully, though according to the measure of the child's intelligence and his capacity and desire for knowledge. This period should not, and, if these indications are followed, naturally would not, in any case, be delayed beyond the sixth year. After that age even the most carefully guarded child is liable to contaminating communications from outside \* \* \* Nor is it necessary for her (the mother) to have the slightest technical knowledge at this stage. It is only essential that she should have the most absolute faith in the purity and dignity of her physical relationship to her child, and be able to speak of it with frankness and tenderness \* \* \* If, as a few believe should be the case, the first initiation is delayed to the tenth year or even later, there is the difficulty that it is no longer so easy to talk simply and naturally about such things; the mother is beginning to feel too shy to speak for the first time about these difficult subjects to a son or a daughter who is nearly as big as herself. She feels that she can only do it awkwardly and ineffectively, and she probably decides not to do it at all. Thus an atmosphere of mystery is created with all the embarrassing and perverting influences which mystery encourages." This argument that the initiation should not be delayed until later years is evidently strengthened by the consideration advanced above,

<sup>6</sup> Op. cit., pp. 48, 49.

namely, that sexual ignorance does not exist in children of these years, so that for the great part the harm is by then already done. As Dr. Blom rightly remarks, "better a year too early, than an hour too late." Dr. Jung has recently published<sup>7</sup> an impressive example of a beginning neurosis in a little girl of four, which was frustrated and cured by a parent versed in psycho-analysis; his remarks on the case contain many important suggestions in reference to the subject of this paper.

The mother's teaching, however, of which the aesthetic aspects are more important than the informative, must always be supplemented by those of the school. During the child's school years the dawning sexual life plays such a significant part that to guide it into useful directions should constitute one of the teacher's most highly important tasks. Two reasons make it imperative that at the present time the school should play a leading part in this respect: in the first place, the attitude to the subject of the present-day mother is so frequently ignorant, shameful, or lewd that the teacher has to replace her so far as is possible, and to perform duties that more properly belong to her; in the second place, it is necessary to train the coming generation in such a way that when their turn comes to bring up children they will not be found wanting, as their own parents for the most part have been. There lies, therefore, before the teacher a generation's pioneering work; in the time to come his task will be less extensive and responsible, but at present he has in his hands one of the greatest opportunities that have ever occurred to his profession, and on the manner in which he responds to this opportunity much will depend of the efficiency and happiness not only of his present pupils, but of their future descendants. It cannot be said that the members of the teaching profession as a whole are well prepared for this task, though it is to be hoped that they are better so than the average parent. Improvement is especially desirable in two respects:

<sup>7</sup> In the third section of the article referred to below.

first, the attitude of teachers towards affairs of sex needs to be much purer and franker than it commonly is, and secondly, they need a fuller knowledge concerning the fundamental facts. For the latter purpose invaluable help would be gained by a series of lectures being given to all teachers by competent instructors selected from the medical profession. This should include the knowledge of how to recognise early signs of nervous disorders in children, for conditions that later cause life-long invalidism and misery commonly evince themselves in childhood, and might be prevented if the early indications were appreciated and appropriately treated. It must further be added that the considerations advanced above suggest in no uncertain voice the great desirability of children not being educated too exclusively by unmarried teachers; a great deal might be said on this topic, which would, however, take us too far from the direct object of this paper. The actual mode of instruction carried out in the school is also unnecessary to consider here, nor can the details of it be settled without some experimental trial; those interested in the subject are advised to read a valuable paper fully dealing with it by Maria Lischnewska<sup>8</sup>. In reference to it Ellis says<sup>9</sup>: "Such instruction would be formal, unemotional, and impersonal; it would be given not as specific instruction in matters of sex, but simply as a part of natural history. It would supplement, so far as mere knowledge is concerned, the information the child had already received from its mother. But it would by no means supplant or replace the personal and intimate relationship of confidence between mother and child. That is always to be aimed at, and though it may not be possible among the ill-educated masses of today, nothing else will adequately take its place." The vexed question of co-education of boys and girls has too many aspects to be discussed here, though it has an evident

<sup>8</sup> Mutterschutz, 1905. Heft 4, S. 137.

<sup>9</sup> Op. cit., p. 57.

bearing on the present subject. I would merely venture a personal and tentative opinion; namely, that, regarding the question from a purely psychological point of view, I am inclined to think that the upper limit of the school age should be raised to sixteen, that both sexes are better educated side by side till the age of twelve, but that during the last four years education should proceed separately, and should consist much more than at present of preparation for the specific duties of life in the broadest sense.

Last, but also quite essential, is the part to be played by the doctor. It would be advantageous for all children to be given before leaving school lectures on sexual hygiene; these are best given by a doctor, and, of course, to both sexes separately. This, however, is by no means sufficient. Every young adult should at all times have direct access to a doctor in whom he would feel confidence, and from whom he could seek advice or knowledge on the many perplexities that are apt to arise. How often does a doctor see patients in after life who have suffered years of misery that would have been averted by a simple explanation given at the right time! At two periods this advice is especially needed; at puberty, and just before marriage.

Before concluding, I wish to say a little on the negative side of the subject, namely, on the dangers to be avoided during sexual development. When enlightenment becomes the usual course followed with children, there will certainly be a risk of its largely consisting of warnings and forbidings. If a child learns the significance of certain bodily sensations, for instance, at the time of puberty, only to be told that they are wrong and improper, then more harm than good will have been done. One of the most urgent reasons why enlightenment is necessary is the fact that at present to so many children the subject becomes one of guilt, shame, remorse and terror, with the result of crippling them in after years through neurosis or in other ways. Unless the avoid-

ance of this is kept in the forefront of attention, it is preferable to leave the whole matter alone, and patiently to submit to the present evils. Better no enlightenment than a false one. It is therefore above all necessary for the parent and teacher to strive to acquire a freer, purer and broader attitude than is now customary, before undertaking the delicate task of avoiding the doing of harm. In years to come we shall perhaps learn how to train and refine the impulses that are so important both for the individual and for the race; at present we should concentrate our efforts on not injuring them. The vital question of the art of love, for instance, is one than can hardly be touched at the present day, when a prurient prudishness spreads its baneful influence over the whole of the finer side of life. Ellis points out that:<sup>10</sup> "Even in the great revival of sexual enlightenment now taking place around us there is rarely even the faintest recognition that in sexual enlightenment the one thing essentially necessary is a knowledge of the art of love. For the most part, sexual instruction as at present understood, is purely negative, a mere string of thou-shalt-nots."

A great deal of good in the matter of prevention of harm can be done in quite indirect ways, by a knowledge of the kinds of influences which may thus affect a child. Of these I will refer to only one, premature sexual excitation. Although it is true that the harmful effect of this is in great part due to the child reacting to it by way of shameful and guilty emotions—thus producing pathological repressions—and not so much to the occurrence itself, still the probability of such a reaction is great enough to make it desirable, on this score alone, to avoid wherever possible premature excitation. Now the most important point that the findings of psycho-analysis teach in this connection is that children are at present exposed to harmful excitation to a much greater extent than is believed. Parents in their blissful blindness imagine that

<sup>10</sup> Op. cit., p. 517.

there is no risk in circumstances which in fact are fraught with dangerous possibilities. Their ignorance is due to their believing that children are too young to be affected by certain occurrences at an age which psycho-analysis shows to be extremely susceptible in this regard. In particular the risks inherent in certain sleeping conditions that are only too common are undoubtedly greater than is generally recognised. Children of a very tender age, from two to five, are liable to experience excitation provoked by older children, or by nurses, which may have grave consequences in later years. It should be an invariable rule that every child should from the beginning sleep in his own bed, and that children of opposite sexes should not sleep in the same room. Further, it must be pointed out that many ill effects ascribed to nurse-maids, servants, and governesses are often due to improper practices on the part of these, and not to the 'frightening of the child with bogies,' as is commonly believed; the bogies in the child's mind are of a real nature, though, for reasons that cannot here be gone into, they may take imaginary forms. Again, under no circumstances should a young child sleep in the same room as his parents, or in a directly communicating one. It will hardly be credited how commonly young children are vaguely excited by overhearing marital embraces, often with harmful consequences.

In this paper it has only been possible to deal with the fringe of a large subject, and to consider some of the more urgent and elementary questions. Much careful work in this direction remains to be done, but perhaps enough has been said to indicate the importance of some aspects of education that are at present too much neglected. There is every reason to believe that if these aspects are scientifically, and not prudishly, scrutinized, it will result in incalculable benefits to the health, efficiency, morals and happiness of generations to come. In conclusion, I would repeat that the first thing we

have to learn is to stop doing harm; then, perhaps, we may learn to do good.

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# THE APPLICATION OF EDUCATIONAL PSYCHOLOGY TO THE PROBLEMS OF THE SPECIAL CLASS.

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The "special class" has for its purpose the educational development of a group of little-understood children, children who have failed in their regular work, but whom we believe can be somewhat helped by special methods. The first business of the teacher here, as in the normal class, is to understand the child.

We now know something of the nature of the normal child. We know that he is a being made up of instincts and impulses, which develop at different times and must be acted upon as they develop. We know a little of what may be expected of a child at the various ages of his life. All this is available for the regular teacher.

Of the dull, backward or feeble-minded child we know very little; consequently, the task of the teacher of this class is vastly more difficult than that of the regular teacher. She has a book to read which has never been translated, for which there is neither dictionary nor grammar, and yet she must somehow read that book, she must somehow understand it, in order to be able to use it.

The story is told that there was once a block of marble which had been rejected by the sculptors as not fit to use. It could not be chiseled and cut in the usual way, and was considered worthless; but a master came along. Michael Angelo picked up this block of marble and from it carved the beautiful David—a priceless work, than which the most promising block of marble never yielded anything more beautiful.

The teacher of the special class may not develop out of the material rejected by the public school a specimen more wonderful or more useful than those turned out by the regular class, but she may develop something that is extremely beautiful and useful in comparison to what it would have been without her ministrations.

Educational psychology seeks to determine the psychological nature of the beings to be educated in order that, the fundamental principles being known, they may be used for the better education of children. It seeks to determine the psychological principles underlying the learning process and to show how to apply them. The special class ought to be a verdant field for educational psychology. Educational psychology ought to be the chief reliance of the teacher of the special class. We are very probably correct in regarding the feeble-minded child as a case of arrest of development. The question arises immediately: What mental processes are arrested, and how far have they developed before the arrest took place? Can such processes be made to continue and develop by any special treatment? Can other processes that have never come to development be brought out by special manoeuvring and manipulation?

Educational psychology tells us that what we are is either acquired or inborn; that if we would expect a child to take the ideas we desire to give him, we must first interest him; and that he will be interested because the ideas appeal to some fundamental inborn interest. Normal children have acquired many interests long before they come to school; consequently, the teacher of such a child has much upon which to build; much of what she attempts to teach meets with a ready response in the mind of the child, because in his five or six years of life he has already learned many things. Such is not the case with the feeble-minded. Dull of sense, dull of intellect, he has not acquired those things that have been acquired by the normal child; consequently, the teacher of the backward or defective child especially, must know

what are his instinctive tendencies. But further than that, as has been intimated, the instinctive tendencies may themselves be arrested, or may never have developed. Hence, it is incumbent upon this teacher to go farther and to learn which of the instincts that are present in the normal child are still present in this subnormal child, which have been arrested, and at what stage. In other words, she must take account of stock, and she must expect to find the cash in the drawer very little indeed. But upon this little she must build. With this as her starting point, she must develop whatever is capable of development in the brain of this defective child.

I have said that the teacher must do this, but the teacher can no more discover this herself than the teacher of the normal child can discover the psychological principles that underlie her work. This must be done by the man of science, by the educational psychologist. It thus becomes the province of educational psychology to study these problems, to discover the facts, and to prepare them for the use of those who have the practical work of training and educating these subnormal children.

Unfortunately, psychologists have not devoted sufficient attention to the subnormal child to afford as much knowledge as we would like to have about the development of the various mental processes in these children. Johnson made a careful study some years ago; Wiley has made some contributions, and Kelley has also published a study. More attention is being paid to the problems now, and we may hope that in the near future important discoveries will be made. The importance of this knowledge for the teacher of the subnormal child is well illustrated by the consideration of memory.

The psychology of memory is, of course, one of the fundamental things in the study of the learning process. The different kinds of memory—how the child uses his memory, how he utilizes the material before him—are very important

elements in the problem of instruction and of learning, and yet misunderstandings resulting from this are the cause of a great many failures of children to make progress. It is well known by psychologists that there are two phases of memory—the natural retentiveness and the logical association. Now a person may have a good memory in either of these respects. The one makes it possible for him to repeat details accurately and for a long time after their occurrence. The other makes it possible for him to reproduce things that have a logical connection. It is seen at once that the latter of these is the more valuable for the development of thought, intelligence, and understanding. A parrot or an animal may have the first, but has not the second.

It is unfortunate for our methods of testing the advancement of a child that we tend to rely too much upon the first kind of memory; yet a child may be able to reproduce and give back to us what we have given him, in the exact language in which we gave it, without ever comprehending what it means. Gratified by the exactness with which he reproduces our language, we are inclined to judge hastily that he has mastered the subject. Nothing could be farther from the truth. This is especially true of the subnormal child. Very often he possesses this natural retentiveness in a high degree. I have known low-grade idiots, who could repeat scripture years after they had learned it and with wonderful accuracy. Indeed, it is well known among those familiar with feeble-minded children that memory is no guarantee of intelligence; it does not even indicate the grade of mental defect.

If, however, we look for memory of the second kind—the logical connection between things—here it is that our subnormal child reveals his insufficiency. Of course, the explanation is that he does not make the logical association, and not making it does not remember. Therefore, in all those things involving that kind of memory, we find him deficient. The importance of the teacher's knowing these fundamental facts

of the subnormal mind cannot be overestimated. Indeed, the gravest danger confronting the teacher of the special class at present is that, ignorant of these facts, she will continue to drill him, as she might drill a parrot, upon those things that he can repeat, reproduce, and give back very nicely, and therefore she is deceived into thinking that he is learning, and that his mind is being trained. This is a grave mistake, not only because the child is not trained by this method, but because time is wasted which could be put to so much better purpose.

Again, we may turn our attention to the psychology of association as an illustration of the importance of a knowledge of educational psychology for the teacher of the subnormal child. The teacher discovers very quickly that the subnormal child does not associate normally. The suggestion of one thing does not call up the thing that to the teacher seems to be most naturally and intimately associated with it, and the question at once arises;—Why is this so, and what is to be done? Here we have to refer to the physical condition of the subnormal child. Undoubtedly, the reason for this lack of association lies in the fact that the association fibers are among the parts of the brain that are most seriously affected. Developing late as they do, it is very probable that the arrest has caught them undeveloped, so that the child does not associate simply because he has not the organs for associating.

Educational psychology also gives us the answer to the question:—What is to be done in such cases? Of course, if there are *no* association fibers (as is very likely the case in the lowest grades), nothing can be done; but if it is a question only of development of the association fibers, then the procedure, in principle, is simple. When the organ to be used is defective, greater care must be taken in using it. In other words, if the child does not associate naturally and easily, it is incumbent upon the teacher to make the associations for him and to force them upon him by continued repetition. This is, of course, exactly what is done in all of the memorizing

that is given such a child to do. We must do the same thing in subjects that we do not usually think of as involving memorizing. The danger always to be guarded against is that we get in all these things precisely what we get in the memorizing of words, merely a verbal association without any thought resulting. However, there is nothing else to do, and we can only hope that some of the associations will somehow have such ramifications that meaning will gradually flow into them.

There are many and different problems before the teacher of the special class that can only be solved by an appeal to educational psychology. The great problem is, Where does this child stand? What may he be expected to do? Wherever we turn we find the same thing involved. For example, many backward children and defectives are decidedly lacking in the power of accurate speech. What shall we do? We have found by experience that some children can be remarkably improved by speech training; others not at all. Which ones shall we train and which ones shall we give up before we begin? The answer to this can only be found by knowing why the child is defective in speech.

Reference to genetic psychology would show us two things; first, that speech depends upon a sound speech organ—not simply the vocal organs but the brain center—and secondly, it depends upon the association fibers, or upon the reason and intelligence of the individual. A child may not be expected to speak distinctly and correctly unless he has a good association between the hearing and speech organs, any more than he can be expected to speak well if he does not hear at all. There must be an idea of the sound, and the connection between the sound and its production by the vocal organs must be clearly established. But when that association is made, the child must also *be able to produce* the sound that he desires to produce.

Now, when we look into this matter further, we discover that there is in many cases a fundamental speech defect, which dates back to the ancestors of the child. In other words,

speech defect is frequently hereditary. In such cases, we may no more hope to develop speech in him than we could hope to develop a fifth finger if he had been born with only four. He has been born without adequate organs for the accomplishing of this thing. We have in our institution one boy who has received speech training for years with no result. We now find, after the study of the family history, that he has inherited this speech defect from his parents and even from his grandparents. It is so general in the family that all his uncles and aunts have the same condition. Had this been known some five or six years ago, an enormous saving of energy on the part of the teacher and an enormous saving of worry and discouragement on the part of the child, would have been accomplished.

One of the much discussed questions at present is:—How much of the usual school studies shall backward or defective children be expected to do? To many teachers, even those in institutions for feeble-minded, the ideal seems to be “as near like normal public school class as possible.” At the other extreme are those who say that none of this work is suitable for feeble-minded children. The answer can only be found, the problem can only be settled by an appeal to educational psychology. We must know the genetics of the case. We must know what mental processes this child has, and what therefore, he may reasonably be expected to do and accomplish. Knowing this, we have our guide, we have our map laid out, and we can follow it with some hope for success.

The relation between educational psychology and the special class is by no means one-sided. If the special class must look to educational psychology for the solution of many of its problems, on the other hand, educational psychology will find in the special class the opportunity for the answers to many of its questions. One of the prime difficulties the student of the developing human mind has, lies in the fact that normal growing minds move by leaps and bounds, and that before one process is definitely understood, it has passed through

all its stages or at least into another condition. Backward and defective children furnish the much desired opportunity for studying the growth of mental processes in beings where that growth is slowed down or stopped.

The problem may be made clear by an illustration. A man stands by the roadside as an automobile passes at forty miles an hour. He sees a cloud of dust, hears the rattle of wheels, smells the odor of gasoline. Before he has time to think whether he knows anybody in the automobile, it is out of sight. Now suppose another automobile passes at the rate of five miles an hour. An observer of this one would not only see how many people were in the vehicle, but who they were and how they were dressed, and after the machine had passed he could give a satisfactory account of what he had seen. Again, suppose the automobile should come along at the very slow pace of perhaps a half mile an hour. He could watch very carefully and learn much more about what was going on. Lastly, if the automobile should stop in front of him he could get into it, examine its mechanism and machinery—learn all about it.

This is precisely what we have in the defective child. We have all grades, from those who are passing at almost the normal rate down to those who have absolutely stopped. Those that have stopped have done so at various stages of their development and consequently we have the opportunity to examine each such child and find out exactly what mental process is active at that time. We can take years for this study and learn all about it.

The teachers of these classes must necessarily make a great many experiments. They must try a great many different plans, and the result of these experiments, when accurate records are kept, must be of the utmost value to the student of human mind. Already these classes in institutions have furnished data of importance, and more than one innovation which has proved to be of the greatest benefit to our public-school system, originated in schools for the feeble-minded. Why did it originate there? Because these teachers found that



nothing else would succeed. They were driven to this method. They did not come to it logically and reason out that this would be likely to succeed, but they tried other methods in vain, until finally this was hit upon and proved to be successful.

Again, the backward and defective pupil has this peculiarity that he is not filled with enthusiasm, as is the normal child. Many a teacher considers her method of teaching some branch successful, when in reality all that has been achieved is the result of her enthusiasm for the work. The method may not fit the child at all, but the teacher manifests a good deal of enthusiasm over it and the child copies her. Now the defective child does not do that. The method that is adopted for his work must fit him or nothing is accomplished.

In institutions there are always found a certain number of children who are known as the clothes-tearers. Visitors frequently find them with their hands in "mits," strapped together. When they ask why this is, they are told that if their hands are not tied, they tear their clothing to shreds. It is found upon examination that the reason these children tear their clothing is that the clothing does not fit them, or does not please them. And being of such low intelligence that they cannot tell exactly what the trouble is, they cannot complain to any one and say that this collar hurts or that shoe pinches. The only thing that they can do is to tear it loose, get rid of it, get it away. And so they are always tearing their clothes. Of course, this very inability to complain, to tell where the trouble is, makes it practically impossible to fit them with clothing. In the same way, they reject, tear to pieces, so to speak, methods that do not fit them. Let a teacher or an attendant attempt to manage them in a way not adapted to their nature, and the result is as disastrous as putting on misfit clothes. This will make it clear why the special class is such a rich field for the educationalist and psychologist.

I have left for the last what I regard as the greatest of all the contributions that educational psychology can make to the special class. It is nothing short of an understanding of what

a mentally defective child is. An important educational association recently devoted a whole session to a decidedly futile discussion of the problems of the backward child. The discussion did not get anywhere and no one went away feeling that he had been enlightened. The whole situation was summed up in a single sentence by a man who has spent his life with feeble-minded children, who has been brought up in connection with the problems of this group of children and who perhaps knows as much about them as any one living. He said, in writing to a friend:—"the cause of the whole trouble is that those people do not know what a feeble-minded child is." No truer word was ever spoken, and nothing truer could be said at the present moment than that no one does know what the feeble-minded child is, except the man or the woman who has spent years with them. But educational psychology will ultimately be able to define a mentally defective child—not only to define it in words but to diagnose every case, and to show definitely in what way and to what extent the child is defective. Then it will be able to make its contribution to the special class and that contribution will be: first, to show us what a feeble-minded child is; and secondly, to show us how we may know the exact degree of defect in the children in these classes. Until this is accomplished, the work of the special class must be largely experimental and the hopes of many teachers must be largely disappointed.

The most common difficulty at the present moment, in places where special classes have been established, is that those in authority, ignorant of what a feeble-minded child is, are holding the teachers up to a standard which cannot possibly be reached. When once the feeble-minded child is understood, and when everybody realizes what he can, and what he cannot do, then the demands will be made in accordance with the ability of the child. The teacher will not be asked to do the impossible, but she will be given her class, and given suitable

materials, and suitable methods, and asked to do whatever can be done, and no more.

Such is the answer to the question:—What can Educational Psychology contribute to the teacher of the Special Class? Many of the foregoing statements will seem dogmatic and even extreme, but this is not an article in which the writer is expected to make contributions to the subject of abnormal psychology, but merely to present a view of the field that will give the reader some impression of its vastness and of its fertility. The statements here made are the mature conclusions from study and work already done, the data for which may be presented later in special papers on various topics.

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The treatment of certain of the insane by educational methods is one of the most significant educational movements of the time. C. T. La Moure, writing in the *Alienist and Neurologist* for August, describes an experiment in the Rochester Hospital. About twenty-five per cent. of the admissions to hospitals are classified as dementia praecox cases, and only about one-sixth of these recover. It is an insanity of youth. These patients have been arranged in classes and stimulated to play and work in various ways. They begin with basket-ball, music, singing, dancing and gymnastics. The patients respond to this educative process and it has a wonderful effect upon their manners, interests, and personal appearance. "During the time the school has been in progress marked improvement is apparent in every case." Several cases have been removed from the violent wards to better wards, where they make no trouble and assist with the work, become tidy, and take a personal interest in their activities. They are taught to sew, weave rugs, make baskets, and do fancy work. The aim is to interest them in the various kinds of work so that each one will be able to assist in the work of the institution. The treatment of the insane covers one of the darkest pages of history. While the estimates of results reported in this experiment may be sanguine, we should rejoice in the undoubted promise which it gives for the future of the young insane.

## COMMUNICATIONS AND DISCUSSIONS.

### PREPARATION FOR EXAMINATIONS IN PSYCHOLOGY.

(Drafted at the request of the Superintendent of Public Instruction by a committee of five representing the Association of Teachers of Psychology in Iowa. Reprinted, with permission, from a circular issued by the Iowa State Board of Educational Examiners.)

This plan of study is prepared for those who desire to meet the psychology requirement for teachers' certificates by private study.<sup>1</sup> There are two grades of examination in psychology offered in Iowa, the *Elementary* and the *Advanced*. The *Advanced* is required for a first-grade certificate, according to the standard adopted in 1907, and should represent distinct professional training; the *Elementary* covers the psychology in all other examinations for teachers' certificates in which psychology is required. In order to secure a uniform basis for the examinations, as well as a proper selection, ten text-books are herewith recommended. In the *Elementary* examination, *three* of these are required; in the *Advanced*, *six*. It is recommended that the candidate select two general and one special text, e. g., the first three mentioned, for the elementary examination; and four general and two special for the advanced examination. (The special books are Kirkpatrick, Seashore, and Dewey; the other texts are all general introductions.)

#### TEXT-BOOKS RECOMMENDED.

BETTS. *The Mind and Its Education*. D. Appleton & Co. \$1.25.

(Elementary and Pedagogical.)

ANGELL. *Psychology*. Henry Holt & Co. \$1.60.

(A comprehensive general survey.)

KIRKPATRICK. *Fundamentals of Child-study*. The Macmillan Co. \$1.35.

JAMES. *Psychology, Briefer Course*. Henry Holt & Co. \$1.60.

(Best known of modern classics in psychology.)

SEASHORE. *Elementary Experiments in Psychology*. Henry Holt & Co. \$1.00.

(A manual of experiments not requiring any laboratory.)

JUDD. *Psychology*. Scribner's Sons. \$1.50.

(General genetic treatment.)

DEWEY. *How We Think*. Heath & Co. \$1.00.

<sup>1</sup> It may also serve as a program for clubs and reading circles.

- TITCHENER. *A Primer of Psychology*. The Macmillan Co. \$1.00.  
 CALKINS. *A First Book in Psychology*. The Macmillan Co. \$1.90.  
 (From the standpoint of the Self.)  
 THORNDIKE. *Elements of Psychology*. A. G. Seiler, New York. \$1.50.  
 (Physiological.)

SUPPLEMENTARY BOOKS.

The following supplementary books for reference are among the best on the subject and should be found in public libraries:

- BALDWIN. *Dictionary of Philosophy and Psychology*. Volumes I and II. The Macmillan Company. \$16.00.  
 BALDWIN. *Story of the Mind*. D. Appleton & Co. \$4.0.  
 BALDWIN. *Mental Development in the Child and the Race*. The Macmillan Company. \$1.75.  
 COMPAYRE. *Psychology Applied to Education*. Heath & Co. \$.90.  
 HALL. *Youth*. D. Appleton & Co. \$1.50.  
 JAMES. *Principles of Psychology*. Volumes I and II. Henry Holt & Co. \$4.80.  
 JASTROW. *Fact and Fable in Psychology*. Houghton, Mifflin Company. \$2.00.  
 JASTROW. *The Subconscious*. Houghton, Mifflin Company. \$2.00.  
 KING. *Psychology of Child Development*. University of Chicago Press. \$1.00.  
 KIRKPATRICK. *Genetic Psychology*. The Macmillan Company. \$1.25.  
 LADD. *Outlines of Descriptive Psychology*. Scribner's Sons. \$1.50.  
 MARSHALL. *Instinct and Reason*. The Macmillan Company. \$3.50.  
 MILLER. *The Psychology of Thinking*. The Macmillan Company. \$1.50.  
 MORGAN. *Animal Behavior*. Arnold, London. \$2.00.  
 MYERS. *Text-book of Experimental Psychology*. Longmans. \$2.40.  
 PILLSBURY. *Attention*. The Macmillan Company. \$2.75.  
 RIBOT. *Psychology of the Emotions*. Scribner's Sons. \$1.50.  
 ROYCE. *Outlines of Psychology*. The Macmillan Company. \$1.00.  
 STOUT. *Manual of Psychology*. Hinds and Noble. \$1.50.  
 STRATTON. *Experimental Psychology and Culture*. The Macmillan Company. \$2.00.  
 SWIFT. *Mind in the Making*. Scribner's Sons. \$1.50.  
 TITCHENER. *A Text-book of Psychology*. The Macmillan Company. \$2.00.  
 WASHBURN. *The Animal Mind*. The Macmillan Company. \$1.60.  
 WENZLAFF. *The Mental Man*. Merrill & Co. \$1.10.  
 WITMER. *Analytical Psychology*. Ginn & Co. \$1.00.

PLAN OF STUDY.

1. For the elementary examination select *three* of the text-books recommended; for the advanced examination, *six*.
2. Read one text through for the purpose of a general survey of the subject.
3. Proceed topically according to the divisions given below and make a brief outline of the facts gathered under each topic in the selected books. (See model below). The outline is an aid to thinking

and is valuable in reviewing; it should be submitted with examination papers. (The outline is, however, not obligatory; it is an advantage). The references do not go into details. They are intended to indicate the general scope of contents and should be supplemented by cross references in the texts and by use of supplementary reading. Take time to answer the questions and perform suggested experiments. Review by topics. Set aside a definite time for study and proceed systematically.

4. The *Advanced* examination is planned to cover the equivalent of six semester hours of a college course (the requirement fixed by the State Board in 1907) or one-fifth of a school year, and should involve a little more than three hundred hours of work on the part of the good average student. On this basis the student may be expected to master about three thousand pages from regular texts and references. Six of the required texts will cover but little more than two thousand pages.

5. The *Elementary* examination represents the equivalent of three semester hours, or one half of the advanced requirements.

6. The state examination will be based specifically upon the recommended books until January 1, 1915. A revision of the course will be published January 1, 1914. (A sample set of questions is given below.)

#### SUGGESTED GROUPING OF TOPICS.

##### 1. Problems and Methods of Psychology.

Angell, I; James, I; Judd, I, XV; Titchener, I, II, XIV, XV; Calkins, I, XIV, XV; Thorndike, I, XXI.

##### 2. The Psycho-physical Organism.

Betts, III; Angell, II; James, VII, VIII, IX; Judd, II, III; Thorndike, IX, X, XI.

##### 3. Neural Action, Habit, and Instinct.

Betts, V, XI; Angell, III, XV, XVI; James, IX, X, XV, XXV; Judd, VII; Thorndike, XII.

##### 4. Attention, Consciousness, and the Self.

Betts, I, II; Angell, IV, XIII; James, XI, XII, XIII; Seashore, XII, XIII; Judd, IV, XII; Titchener, V, XI; Calkins VI; Thorndike, VII, VIII, XXII.

5. Sensation.  
Betts, IV, VI; Angell, V; James, XV, XXI; Seashore, I, II, III, V, VII; Judd, V; Titchener, III; Thorndike, II.
6. Perception.  
Angell, VI, VII; James, XV, XX, XXI; Seashore, IV, V, VI, VIII, XIV; Judd, V; Titchener, VI; Calkins, II, III, IV, V.
7. Imagination.  
Betts, VII, IX; Angell, VIII; James, XIX; Seashore, IX; Judd, XI; Thorndike, IX.
8. Association and Memory.  
Betts, VIII; Angell, IX; James, XVI, XVII, XVIII; Seashore, X, XI; Judd, IX, XIV; Titchener, VII, X; Calkins, VII, VIII; Thorndike, XIII, XIV, XVI, XVII.
9. Conception, Judgment, Reasoning, and Language.  
Betts, X; Angell, X, XI, XII; James, XIV, XXII; Judd, X; Dewey, "How We Think" (Entire Book); Calkins, IX, X; Thorndike, IV, VII.
10. Affection, Feeling, and Emotion.  
Betts, XII, XIII, XIV; Angell, XIII, XIV, XVIII, XIX; James, XXIV; Seashore, XV; Judd, VII; Titchener, I, VIII, XII; Calkins, XI, XIII; Thorndike, V.
11. Volition and Action.  
Betts, XV, XVI; Angell, XVII, XX, XXI, XXII; James, XXIII, XXVI; Seashore, XVI; Judd, XIII; Titchener, IX, XIII; Calkins, XII; Thorndike, VI, XVIII, XII.
12. Mental Development.  
Kirkpatrick, "Fundamentals of Child Study" (Entire Book); Cf. The other required texts and some books from the supplementary list.

#### SAMPLE OUTLINE.

Angell, Ch. I, 1-12.

*Definition.* A systematic description and explanation of mental facts.

*Consciousness.* Defined in terms of itself, by enumeration, e. g. sensations, ideas, memory. Does not occupy space. Exists for itself.  
A personal experience.

*Former Def.* 'Sci. of the soul' implies too much; psy. is limited to experience. 'Sci. of mind' is too narrow; psy. deals with all cons.

*Procedure.* (1) Description of mental processes and their relations.

(2) Explanation; analysis, development, physiological basis, environment.

*Fields.* Normal, human, adult (field of this book); child, abnormal, individual, social, animal, and genetic.

*Methods.* (1) Introspection; direct examination; involves memory; co-operation.

(2) Direct objective observation: obs., expression; systematic, scientific. All other methods are aspects of introsp. Qualitative and quantitative.

(3) Experiment; controlled introsp.; repetition.

(4) Physiological and (5) Psycho-physical: relation between physical and mental processes; experimental; supplement introsp.

*Relations.* All methods are used in various fields.

*Standpoint.* The biological point of view. Cons. a phenomenon of organic life. The human organism is psychophysical, a real unit. Adaptation of the organism to the environment—physical and social. Mind the master device for adaptation. Leads to right spiritual view.

*Natural Sci. Psy.* (1) selects a definite field—cons. as a life process: (2) makes assumptions—reality of mind, matter, and knowledge; and (3) applies principle of causation. The knowing process, a peculiar relation.

*Biology.* Psy. a biological sci. Exchange of aids.

*Philosophy.* Psy. is an outgrowth from phil. and serves as an introduction to it; relation intimate, especially to ethics, logic, and esthetics. Metaphysics investigates the assumptions of psychology.

*Education.* Theory and practice. Knowledge of the mind for the training of the mind.

#### SPECIMEN SET OF EXAMINATION QUESTIONS.

##### *Elementary Psychology.*

(Write on four of the five topics.) Time, two hours.

##### I. Consciousness:

- (a) Its functions;
- (b) Its relation to neural processes;
- (c) Its changes in habit formation.

##### II. Mental Images:

- (a) Method of detecting and classifying;



- (b) Their role in memory;
  - (c) Their role in thinking.
- III. Instinct:
- (a) General characteristics;
  - (b) Biological significance;
  - (c) Educational bearings.
- IV. Play:
- (a) Theories of play;
  - (b) Its function in the spontaneous growth of the mind;
  - (c) Some principles of attention illustrated by play.
- V. Psychological Laws:
- (a) Three laws of sensation which have a physiological basis;
  - (b) Three laws of perception with reference to the validity of knowledge;
  - (c) Three laws of mental economy.

*Statement to the Examiner.*

The candidate shall deposit with the examiner a statement of (1) normal school, college, or university training; (2) preparation for this examination—naming books mastered, references read, instructors, and facilities; and (3) designation of outlines and notebooks, if any, deposited for inspection.

## A STUDY IN THE CORRELATION OF ELEMENTARY AND HIGH-SCHOOL GRADES.

School grades present many interesting problems from the view point of educational psychology. Recently Professor W. F. Dearborn published a study, "The Relative Standing of Pupils in the High School and in the University" (Wisconsin) in which he demonstrates that students in the university maintain to a marked degree the same relative ranking which they held in the high school. The main purpose of the study, which is here summarized, has been to make a similar investigation of the relationship between elementary and high-school training.

Only such records were included in this study as showed the completion of at least the last four years of the elementary school and the first two years of the high school. There were 106 records available from the Iowa city schools under this arbitrary standard. By mere

chance these represented 53 girls and 53 boys. Two methods of correlation were employed, the Pearson coefficient and the method of quartiles.

A very few of the Pearson coefficients may be mentioned here. The coefficient of correlation between the average elementary school standing and the average high school standing was found to be  $+ .71$ . (The similar coefficient in Dearborn's study was about  $+ .80$ ). Coefficients obtained by correlating the ranking in various subjects were usually quite high, the average was approximately  $+ .52$ . The subject that showed the highest average coefficient was Geography,  $+ .66$ ; Spelling showed the lowest average,  $+ .44$ . Several interesting points came to light regarding rates of progress and the factor of sex.

In general one may say our study would indicate that the great majority of students who take the high-school course have made rapid, or at least normal progress, i. e. making a grade each year, in the elementary school, while most of the high-school students fail in some of their work; the schools seem to be much better fitted for girls than for boys; the individual student in passing from the elementary school to the high school seldom changes radically his ranking and the rank which he receives in any one subject will usually represent quite nearly the student's average standing.

WALTER R. MILES.

University of Iowa.

#### A COMPARATIVE STUDY OF THE RESULTS OBTAINED IN THE ELEMENTARY BRANCHES OF GRADED AND RURAL SCHOOLS.\*

Just what is the result of the grading system as found in our city schools? The writer has during the past year made a study of this question to find out what might be the difference in knowledge of Arithmetic, Geography, Grammar, History, and Spelling between the children of graded and rural schools. In making this study, lists of examination questions were sent to superintendents and principals, who submitted them to the pupils of the eighth grade. The examinations were given during the last week of February to the B Class. The ques-

\* A full report on this investigation will appear in the Elementary School Teacher.

tions were sent to all at the same time and for the most part the results were received within a couple of weeks.

The age, time required to write the paper, and the date were all recorded. It was found that the children in the eighth grade of rural schools were .92 of a year younger than those in the city schools, but required in the Arithmetic test an average of almost an hour longer to write it. The returns from 211 grade children, and 177 country children were divided into two groups, one for the girls and the other for the boys. The questions were grouped under the heads "mechanical" and "reasoning."

When the results were compared it was found that the children from the country had received a higher average per cent. in every branch, not only in the "reasoning," but also in the "mechanical" group. To what are we to attribute this superiority of the country children? Certainly it is not due to the superiority of their teachers, the better quality of their texts, the length of the school year, or the equipment of their schools. It is more likely due to the lack of correlation between the urban community and the school, and the inflexibility of the grade system, two conditions that indicate inferiority on the part of the city schools rather than superiority on the part of the rural schools.

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## THE EFFECT OF THE TRAINING SCHOOL UPON THE CHILD AS SHOWN IN HIS SUBSEQUENT SCHOOL WORK.

Every school that plans to prepare teachers, whether normal school, college or university, should have a training school as the central feature of such a plan.

The position of the training department has been and is in many instances a secondary one and the work has been fitted as well as possible into the vacant periods of the department of theory.

The department of training has been in most cases too small to serve in any adequate manner its true function, and too often it has been a series of show rooms in charge of expert teachers, who work under conditions that exist, but seldom if ever in outside experience.

Sometimes these teachers put their children through mental gymnastics for the benefit of the teachers in training and this is called observation.

The function of the department of training is, *first*, to enable the teacher in training to observe skillful teaching to the end that he may adjust himself to the *second* function of the department of training, that of giving to the teacher in training effective experience in teaching, not a proxy experience, but actually taking up the responsibilities of the teacher and being held to an account for the results.

Too often the embryonic teacher is expected to teach in the presence of the critic teacher and a number of student observers, without having had previous adjustment to the class.

Under such circumstances there can be natural development of neither teacher or child.

The training department should have its classes well graded after the plan of the better public schools and it should not be given to the following of fads.

The regular teaching force should give much of its energy to furthering the interests of the child, correcting such errors as may arise from the work of the young teachers, and in giving coherence and unity to the work, as well as supervising and helping the teacher in training.

The methods of organization for training schools differ much, but they are all classed here under three divisions.

*First*—Those that have a critic teacher present in the room practically all the time, whose duty it is to see that no mistakes arise. Whether the critic teacher teaches or permits the student in training to do the work, her presence is a stimulus that forces the child, and under such conditions the children make splendid progress; there is such a positive and almost unanimous agreement among normal school teachers on this point that no investigation has been made of this class of training schools.

*Second*—Those that have a critic teacher in charge of at least two rooms, so that she can be present not over one-half the time, thus leaving the teacher in training in charge and largely responsible for the children in one room; this plan permits the individuality of the teacher in training to be shown and its effect on the children noted.

*Third*—Those that have department supervision, the critic having charge of a subject in all the grades instead of having charge of all the subjects of a given grade.

Under this plan the teacher in training is given a grade to teach daily in one or more subjects for a given time. This teacher is held responsible for the results produced; she is under frequent inspection and has regular conferences with the critic who has charge of that subject.

This plan gives the teacher in training time to establish natural relations with the class, reform her ideas and ideals of method, subject matter, and discipline, and best of all to free herself from the excess of method and device that has been accumulated during the course in theory.

There can be no doubt that the larger the responsibility and freedom of the teacher in training under skillful direction and suggestion, the stronger she will be when sent out to take up the work in other schools. The only question in the minds of most critics is, what is the effect on the children when they are taught by inexperienced teachers, even under good supervision,

As a partial answer to this question this investigation has been carried on. Only the second and third divisions of the training schools were investigated and the plan was to divide the graduates for a number of years into three classes.

*First*—Those that had their elementary course in the grades of the training school and subsequently completed the normal course.

*Second*—Those that had their elementary course in the grades of the public schools of the city in which the normal school is located and who also completed the normal course.

*Third*—Those that had their elementary course in the grades of any other school than those named in classes one and two and who then completed the normal course.

The school selected for the study under division two (i. e. where one critic has charge of at least two rooms at the same time) is one of the largest and most successful normal schools in Pennsylvania and the records of about six hundred graduates covering a period of about eight years were examined and classified under the above headings and the results expressed in per cent. follow: See table No. 1.

TABLE No. 1.

General Average	Training School.	City Schools.	All Other Schools.
For the Course	86.81%	86.29%	85.41%
Average in			
English	88.60%	86.62%	85.72%
Average in			
Science	85.60%	84.37%	83.39%
Average in			
Mathematics	84.90%	83.39%	83.14%

In this part of the investigation it was possible with a fair degree of certainty to compare the scholastic attainment of these students in different subjects, so English, science and mathematics were selected as representing the various phases of subject matter and theory that the student meets and the average results in these subjects for the course are given for the three groups of students.

There is a marked uniformity in the differences shown in the above table.

The school selected for investigation under division three (i. e.) where department supervision obtains and much of the responsibility is placed upon the teacher in training, is one of the largest and most successful normal schools in the state of New York.

The records of over eleven hundred graduates, covering a period of about ten years, were examined and classified under the headings given before, and the results, as expressed in per cent, follow: See table No. 2.

TABLE No. 2.

	Training School.	City Schools.	All Other Schools.
Average grade for the normal course.....	86.76%	86.40%	86.95%

Owing to the difference in entrance requirements it was not possible to work out the subject averages for the New York school as was done in the case of the Pennsylvania school.

In the New York school those receiving an average grade of 89.5% or over for the course are counted as being in the honor group.

9.76% of the graduates were from the training school and they received 12.80% of all the honors based on scholarship and 30.18% of these students were in the honor group.

9.41% of the graduates were from the schools of the city in which the normal school is located and these students received 8.40% of the honors and 20% of them received honors.

80.82% of the graduates were from other schools and they received 78.80% of the honors and 21.84% of these students received honors.

It is evident from the data that the students who received their elementary course in the training schools of these two normal schools showed no weaknesses in their advanced courses that could be laid at the door of the training school.

It was found that the students in class three were older than those in either of the other classes in the New York school.

There are always many local conditions that make it difficult to compare such results very closely and it would be unfair to draw general conclusions from the data at hand. There should be further investigation so that a positive answer could be given to the question as to the effects upon the child of having been subjected to the various experiences of the training school.

It might be possible to come to some conclusions as to the best method of organization for a training school; it would be valuable to know the kind and quantity of supervision needed—in fact the training school is a promising field for study and one that needs to be studied in order to increase its efficiency.

C. B. ROBERTSON,

Superintendent of the Schools for Training, Cortland State Normal and Training School, Cortland, N. Y.

## EDUCATIONAL PSYCHOLOGY AT THE THIRD INTERNATIONAL CONGRESS ON SCHOOL HYGIENE.

The International Congress on School Hygiene held its third triennial meeting at Paris during the first week of August, under the honorary presidency of the Minister of Public Instruction, and the presidency of Dr. Albert Mathieu. Of the eleven sections into which the Congress was divided, Section IX, under the presidency of Professor Gustave Lanson, was most largely devoted to the psychological aspects of the general problem.

In this section important papers were presented by Dr. A. Chaillou and Professor Kemsies on the subject of standard time-tables for children of different ages. Dr. Chaillou advocates a daily programme which shall take account of the needs of all parts of the organism—digestive, muscular, respiratory, as well as cerebral—and which therefore prescribes the hours for meals and for play as carefully as the hours for lessons. According to this plan, recreation periods are given at frequent intervals, no recreation period being longer than one hour. Professor Kemsies' paper includes model time-tables for the classes in the gymnasium, real-gymnasium, oberrealschule, and vorschule.

At another meeting of the section, the causes and remedies for inattention were discussed by Professor Mendousse, Professor Schuyten and others. Professor Mendousse urges the removal of the physiological causes of inattention wherever these exist, more vitalization of pro-

grammes, better school discipline, more knowledge of psychology on the part of teachers. Professor Schuyten criticized the time-tables commonly found in schools, and emphasized the importance of the experimental study of children as the proper basis for such a classification of pupils as shall remove many of the causes of inattention.

At the third meeting of the section the subject for discussion was "Advantages and Disadvantages of Distributing or Concentrating Lessons in Planning Time-tables." In his paper on this subject, Professor Lévy-Wogue advocated a large amount of distribution for the early years of secondary education, and a relatively large amount of concentration for the higher classes of the lycée. Mr. Arnold Schrag's report embodied a plan for concentration in which mathematical and scientific studies are correlated by means of manual activities.

All the meetings of the Congress were held in the Grand Palais des Champs Elysées, with the exception of the opening and closing sessions, which were held in the Sorbonne.

ANNA J. McKEAG.

Wellesley College.



## NOTES AND NEWS.

In the *Journal of Philosophy, Psychology and Scientific Methods* for September 15 Mr. William Brown, of London, reports the results of an examination on three mathematical papers (geometry, arithmetic and algebra) of 83 boys from the five middle forms of an English public school. The answers were marked under the following nine heads: A. Memory of definitions and general principles (e. g., principle of superposition) in geometry. B. Memory of constructions (geometry). C. Memory of preceding propositions and power of applying them (geometry). D. Recognition of necessity of generality in proof, and power of recognizing general relations in a particular case (geometry). E. Accuracy in arithmetic. F. General memory of rules and power of applying them (arithmetic). G. Power of doing sums in percentage and proportion (arithmetic). H. Accuracy in algebra. I. General memory of rules and power of applying them (algebra).

From these marks, together with the total marks in geometry, algebra and arithmetic, coefficients of correlation were calculated by means of the Pearson product-moment formula. Geometry and algebra are not at all closely related (0.18), while arithmetic is much more closely related to algebra (0.76) than to geometry (0.28). C and D show high correlation (0.91), as one would expect, and C bears the same relation to G (0.28) as geometry bears to arithmetic. D is only slightly related to G (0.11), G and I show no relationship at all (0.0), and F and I are scarcely better (0.04). F and G are fairly close (0.41), and the connection between E and H (0.33) gives some ground for the assumption of a general characteristic of accuracy. For further details readers are referred to *Biometrika*, Vol. VII., part 3.

In an article entitled "A Neglected Cause of Retardation" (*Educational Review*, 1910), Mr. W. D. Sheldon, of Girard College, maintains that the lack of individual attention to pupils in the lower grades is one of the most important factors in causing retardation. Without citing statistical evidence, he asserts that the beginning classes in the city schools sometimes number sixty or seventy pupils, all of whom must

be looked after by a single teacher. If we are not mistaken, Miss Georgia Alexander, of Indianapolis, presented statistics at the Boston meeting of the N. E. A., showing that the teachers of these beginning classes are very frequently undertrained and incompetent. This discovery is probably a surprise to most schoolmen, for it is the general belief that the teachers of beginning classes are commonly selected from among those who have been successful in second-grade or third-grade work.

The psychological laboratory of the University of Illinois has recently been enlarged. It now occupies practically the entire fourth floor of University Hall, thirteen rooms in all. The department has become one of the largest in the University in point of number of students enrolled. The registration in the introductory courses for the fall semester is about two hundred and fifty, a significant increase over preceding years.

Editorial comment in the educational press anent the election of Mrs. Ella Flagg Young as president of the N. E. A. is interesting reading. The *Journal of Education* (Boston), which was one of Mrs. Young's strongest supporters in the preliminary "campaign," is naturally exuberant in its rejoicing. *Education* (Boston) believes that the choice was a wise one, but strongly deprecates the political methods employed. The *Educational Review* is very frankly disappointed, especially at the failure of the Association to concur in the recommendations of the nominating committee. The last-named journal also criticizes very severely the general tone of the papers and discussions. "A dispassionate critic," it avers, "will look, without finding, for any note of leadership, for any note of constructive power, or for any note of genuinely clear thinking in the papers presented at Boston. Not a few of the papers that were most favorably received were nothing more than snarling and destructive criticisms of existing phases of teaching and administration. Men and women who should have known better discredited themselves and their papers by unwarranted, careless and often flatly untrue attacks upon the existing order in the schools. . . . The total impression produced was sad and discouraging." We confess that these animadversions sound to us somewhat like a lament of the "Old Guard," bewailing the "good old days" when everything moved according to expectation, and criticism was constructive because it came from "our side."

The International Committee of the Congress on School Hygiene accepted the invitation of the City of Buffalo, conveyed by Dr. F. E. Franczack, and endorsed by the American Association of School Hygiene, to hold the next meeting there. The meeting will probably take place in the second week of August 1913.

After much opposition and acrimonious debate two women were appointed on the International Committee of the Congress on School Hygiene. They are Dr. Helen MacMurchy of Toronto and Dr. I. Ioteyko, the well-known head of the Kasimir Laboratory at Brussels.

A resolution was passed at the Paris Congress by the section on educational buildings demanding that no new school be built without a school bath. Professor Grønness, of Christiania, reported that nineteen out of the twenty elementary schools in that city had shower baths. *School Hygiene* says: "During this discussion the British delegates had to be shamefacedly silent, for they could report practically no progress in this direction." We wonder what sort of report the American delegates were able to make!

An important place was given at the Paris Congress to the subject of Sex Hygiene. It was agreed that instruction in this subject should begin early, that the questions of children should be frankly answered in the home, that children should be taught the sex relationships of plants and animals in the early years of school life, and that the essentials of human sex relations should be presented in connection with biology before the adolescent period has been reached.

A new association, the International Association of School Doctors, was formed on August 5, 1910. At the instance of the Societe des Medecins—Inspecteurs des ecoles de la Seine—a preliminary meeting was held at the Grand Palais, Paris. Representatives of all countries taking part in the School Hygiene Congress were present. The objects of the new Association are to preserve and strengthen friendly relations between the school doctors of different countries, and to co-operate in carrying out well-recognized improvements in all branches of school hygiene, the status of the school doctor coming under this heading. The French Society has been authorized to draw up a constitution and Dr. Butte, 40 Rue St. Placide, Paris, is acting as temporary secretary.—*School Hygiene*.

In a bitter attack on the elective system Professor Ernest G. Sihler, of New York University, in the *New York Evening Post* of October 1, makes a distinction between "purely eruditional courses, pabulum utterly beyond the range and faculty of our adolescents," and courses whose chief function is to train the powers "to that point where independence of effort is fairly assured for coming life and manhood." Chief of these training courses are Greek and mathematics. The essence of a liberal education is said to be "the training and forming of the higher powers, viz., to think, to reflect, to reason, to argue, to weigh, to recall, to review, to compare, to marshall in order, to arrange and coördinate, to utter and prove, to appeal and to lead." Just why Greek and mathematics are less eruditional and better fitted for training in all these varied activities than biology or history, for instance, the learned professor does not deign to reveal. Such a view of "mental training" would seem to indicate a reversion to the crassest sort of formalism. What we need is not the outcry of blind prejudice for or against certain studies, but careful experimentation to determine what results different kinds of study actually produce.

A committee of fifty-seven, representing religious denominations and the public school system in England, have reported a plan "to promote and maintain religious teaching as an integral part of the national system of education and to work on non-party lines for an educational settlement which will respect all forms of conscientious belief." *The Journal of Education*, London, considers it an extraordinary case of common sense and love of fair play and thinks that it may work out well in the cities, but is likely to fail in the country districts.

A conference on the moral phases of public education has been called by the council of the Religious Education Association to meet in New York City February 16 and 17, 1911, for the purpose of considering ways and means of advancing moral instruction in public education. The general question before the council is what advanced steps should now be taken? The conference will not be open to the public.

The National Society of College Teachers of Education has chosen for the subject of discussion at its next meeting: "Co-operative research within the field of education; its organization and encouragement." The secretary of the society, E. O. Holland, of Indiana University, has accordingly invited each member to outline some problem which he believes ought to be worked out in education, and to describe

the proper scientific method of attacking the problem. This movement deserves the consideration of our readers, and we are glad to call attention to it as a sign of healthy activity along the lines of experimental pedagogy.

The Hungarian Child-Study Association is to establish a paidological museum in Budapest. It will contain paidological, ethnographical and pedagogical sections.—*Zeitschrift für angewandte Psychologie*.

On November 4 and 5 the Northern Illinois Teachers' Association will hold its annual meeting at the University of Chicago on the invitation of the School of Education. Prominent educators will contribute papers on various phases of the general subject: "The Concrete in Education."

Professor Edouard Heinrich Henoch, one of the founders of modern pediatrics, died at Dresden on August 22 in his ninety-first year.

At the opening of Charing Cross Hospital Medical School, London, on October 3, Dr. F. W. Mott, F. R. S., delivered the eighth Huxley lecture on "The Hereditary Aspect of Nervous and Mental Diseases."

At the opening exercises of the one hundred and fifty-seventh academic year of Columbia University on September 28 Professor Henry Fairfield Osborne, head of the American Museum of Natural History, delivered an address on "Huxley on Education."

At the New York University School of Pedagogy a special course is offered again this year in the "Education of Defectives" by Dr. H. H. Goddard, Director of the Research Laboratory, New Jersey Training School for Feeble-Minded Girls and Boys, and Dr. Mary Sutton Macy. A feature of the course is a series of clinics to illustrate the lectures, so that the first part of each lecture is devoted to the examination of some defective child.

Professor A. O. Norton, of the department of education, Harvard University, is absent this year on sabbatical leave, and his place is being taken by Professor E. P. Cubberley, of Leland Stanford Junior University.

Among the lectures in illustration of recent progress in various departments of physical investigation to be delivered at the Royal College of Science, South Kensington, London, are ten lectures on "Color Vision," by Sir William De W. Abney, K.C.B., F.R.S.

The University of Illinois is offering, through the Department of Psychology, a course in experimental pedagogy for the benefit of teachers in Champaign, Urbana, and the neighboring towns. The class meets for lectures and laboratory work on Saturday mornings, and is in charge of Dr. A. H. Sutherland.

In the *Atlantic Educational Journal* for September Superintendent J. M. Greenwood, of Kansas City, indulges in some interesting comments on a drastic criticism recently published in the same journal concerning Professor C. M. Gayley's "Idols of Education." The following extract indicates the trend of Dr. Greenwood's remarks: "The greatest danger threatening and actually rooting itself in our entire system of education is that of too much interference by motive grinders on low planes, light beauty thrills, aesthetic teas, ragtag fairs, things not shaped into vital thoughts, few things wound up or buttoned up in the work done, too much nursery business imported from somewhere and not enough downright, solid work all along the line for those that dress, eat, digest, play and sleep."

The September number of *School Hygiene* (London) is devoted to a special report of the Third International Congress on School Hygiene, held in Paris August 2-7, 1910. The number contains the inaugural address of the president, two of the papers presented at general meetings, and a very complete summary of the discussions in the eleven sections.

In the current number of *L'Igiene della Scuola* Dr. G. Risso gives a detailed account of the struggle of the city of Genoa with contagious eye diseases, such as tracoma and follicular conjunctivitis. In 1906 a commission was appointed to deal with the problem, and a census of the elementary schools showed that out of a total enrollment of 19,155 pupils, 899, or almost 5 per cent., were suffering from contagious infection of the eyes. The pupils affected with conjunctivitis were segregated in special seats in each room where they were found, while for those suffering from tracoma a special school was established in 1908. In the two years of the school's existence 561 pupils have been enrolled, and of these 233 have been returned to the public schools as cured.

A bill for the teaching of sex hygiene has been proposed in Italy. The instruction is to be at the option of the Provincial School Council in elementary schools, but mandatory in all other schools, and is to be adapted to the age, sex and condition of the pupils involved.

Mr. N. W. Harris, president of the Harris Trust and Savings Bank, of Chicago, who was born in Becket, Mass., has offered to supply every boy and girl of his native town with \$5.00 a week for four years to assist in securing a high school or college education, on condition that they maintain a rank of 80 per cent. in scholarship.

The last issue of the University of Colorado Studies contains an article by Professor Vivian A. C. Henmon, now of the University of Wisconsin, on "Sex Differences and Variability in Color Perception."

At the University of Iowa Dr. Mabel Clara Williams has been promoted from instructor to assistant professor of psychology.

Dr. Knight Dunlap has been advanced to the position of associate in psychology at Johns Hopkins University.

Dr. Dudley B. Reed, formerly of Asheville School, Asheville, N. C. has been appointed physical director at the University of Rochester.

Frank W. White, M. D., has been promoted from assistant professor to professor of physical education at Lehigh University.

Dr. Margaret B. Wilson has been appointed professor of physiology and hygiene at Normal College, New York City.

Dr. Paul R. Radossawljewich has been added to the faculty of the School of Pedagogy, New York University, and is giving courses in experimental pedagogy and in the anthropological study of school children.

Frederic Lyman Wells, Ph.D., Assistant in Pathological Psychology in the McLean Hospital, Waverley, Mass., has been appointed lecturer in psychology at Columbia University.

Professor Felix Krueger, privatdocent in the University of Leipzig, has been called to Halle as the successor of Professor Meumann, who has gone to Leipzig.

Among the Macmillan announcements for fall publication are "A Text-Book of Psychology, Part II," by Professor E. B. Titchener, Cornell University; "Principles of Secondary Education, Vol. III, Ethical Training," by Professor Charles De Garmo, Cornell University; a third edition of "The Grammar of Science," by Professor Karl Pearson, of London, and a book on principles of education by Professor E. N. Henderson, Adelphi College.

## PUBLICATIONS RECEIVED TO OCTOBER 1, 1910.

W. BATESON, M. A., F. R. S., V. M. H. *Mendel's Principles of Heredity*. Cambridge: University Press. New York: G. P. Putnam's Sons, 1909. Pp. xiv, 396. \$3.50 net.

This book will be reviewed later.

JOSEPH V. COLLINS, Ph.D. *Practical Algebra.—First Year Course*. New York: American Book Company, 1910. Pp. 301. 85c.

This introductory course in algebra is an outcome of the reform movement in the teaching of mathematics in this country. The author has attempted to correlate algebra more closely with arithmetic and geometry than is the usual practice. The book contains a large number of practical and informational exercises and problems, and encourages proving and checking results. Attention is paid to graphic methods of solution, and there are many diagrammatic illustrations and a number of historical and biographical notes.

H. DE VRIES. *Intracellular Pangenesis*. Including a paper on Fertilization and Hybridization. Translated from the German by C. Stuart Gager. Chicago: Open Court Publishing Company, 1910. Pp. xvi, 270. Price \$3.00 net.

De Vries's "Intracelluläre Pangenesis," first published in 1889, is well worth translating if for no other reason than because of its historical importance. It was in this essay that the author first developed his theory of "pangens" from which the doctrine of unit-characters and ultimately the mutation-theory gradually developed. Historical interest is also added by the title of the essay, for it was Darwin's "well-abused hypothesis of pangenesis" that first started DeVries on the long road which culminated in the most important contribution to evolutionary doctrine that has been made since the publication of the "Origin of Species." The appended paper on fertilization and hybridization shows the bearing of more recent researches on DeVries's original pangenetic theory.

T. W. GALLOWAY. *Text-Book of Elementary Zoölogy*. Philadelphia: P. Blakiston's Son & Co., 1910. Pp. xx, 418.

Although this book is a text in the special field of zoölogy it deserves notice in this Journal because, unlike most books of its class, it represents an attempt to apply to the teaching of secondary science, some of



the recognized principles of psychological procedure. The author has had in mind especially three principles: (1) a proper motivation for class, laboratory, and field work in zoölogy; (2) the necessity for emphasizing the mental attitudes, the habits of intellectual activity and the necessary processes through which sound conclusions are reached as fundamentally important outcomes of the teaching; and (3) the necessity of making the teaching consistent with the general law that mind normally begins with large wholes then proceeds to analysis following this by a synthesis of the analyzed parts. Economic applications are referred to incidentally in connection with the systematic treatment and a final chapter is devoted to a brief summary of these economic principles. In this respect the treatment is perhaps rather more conservative than the principles of "motivation" so strongly emphasized by the author, would seem to justify.

HENRY H. GODDARD, Ph.D. *What Can the Public School Do for Sub-Normal Children?* The Training School, 7: No. 5, Sept., 1910. Pp. 242-248.

In this paper, presented at the Boston meeting of the N. E. A., Dr. Goddard discusses the classification of feeble-minded children, their prevalence in the public schools, the formation of special classes, course of study and methods of teaching, the qualifications of teachers and the special training required. The introduction of the term "moron" for high-grade feeble-minded is to be commended, and we trust that the expression will find general acceptance.

M. W. KEATINGE, M. A. *Studies in the Teaching of History*. London: Adam and Charles Black. New York: The Macmillan Company, Agents, 1910. Pp. 232. 4/6 net.

This interesting and valuable contribution to the subject of method in teaching history should be warmly welcomed by high school teachers of the subject. The first four chapters deal with method in connection with subject matter, the fifth on Method and Moral Training contains a psychological analysis of the possible effects of history teaching upon conduct, while the remaining six chapters treat of more general topics. Among the latter one notes a chapter on History and Poetry, but it is surprising that no mention is made of prose fiction in relation to history.

JOHANN HEINRICH PESTALOZZI. *Ueber Gesetzgebung und Kindermord. Wahrheiten und Träume, Nachforschungen und Bilder*. Mit einer Einführung und Ammerkungen neu herausgegeben von Dr. Karl Wilker. Leipzig: J. A. Barth, 1910. Pp. 274. M. 4. Geb. M. 4.80.

Recalling the preaching of Bernard Shaw on the inalienable rights of the mother instinct, and the utterances of our strenuous ex-president on race suicide, one would think that this work on child-murder and the law by the great Swiss educator had been written within the last few years.

instead of in 1780. In view of present social conditions the ideals here set forth are of great interest and importance today.

A. C. PERRY, JR. *Problems of the Elementary School*. New York: D. Appleton & Co., 1910. Pp. viii, 224. \$1.25.

Will receive notice later.

HENRY ALFORD RUGER, Ph.D. *The Psychology of Efficiency. An Experimental Study of the Processes Involved in the Solution of Mechanical Puzzles and in the Acquisition of Skill in Their Manipulation*. New York: Archives of Psychology, No. 15, June, 1910. Pp. 88. 90c.

The six chapters of this interesting monograph give a description of the experiments performed, a general statement of the results and a discussion of the conditions of efficiency, an analysis of the solution of problems, puzzle material and tests of intelligence, an analysis of the practise curve and a discussion of transfer. The work is an important contribution to the study of the learning process, and will receive more extended consideration in this Journal.

SAMUEL BOWER SINCLAIR, M. A., Ph.D., AND FREDERICK TRACY, B. A., Ph.D. *Introductory Educational Psychology. A Book for Teachers in Training*. New York and Toronto: The Macmillan Company, 1909. Pp. xii, 180. 90c. net.

This little manual contains a large number of simple questions and exercises designed to stimulate the student to reflect on the mental activities involved in education. Each chapter closes with brief didactic maxims for school room application. There are no references to the literature of the special topics treated, and no account is taken of the experimental work of others.

GUSTAV SPILLER. *Moral Education in Eighteen Countries*. London: Watts & Co., 1909. Pp. 362. 3/6 net.

An authoritative presentation of moral instruction in the leading countries of the world. Part I. Introductory, discusses in 125 pages the attitude of the churches to moral instruction, and the general problem of moral education. Part II. presents a detailed report of the procedure in each of the countries considered and Part III. gives an extensive and very valuable bibliography of 56 pages, the more important titles of which are accompanied by explanatory notes.

CARL STUMPF, Editor. *Beiträge zur Akustik und Musikwissenschaft*. 5. Heft. Leipzig: J. A. Barth, 1910. Pp. 167. M. 5.

The greater part (142 pages) of this number of the *Beiträge* is devoted to Professor Stumpf's discussion of combination tones, which is

here reprinted from the *Zeitschrift für Psychologie*. In it we have Stumpf's analysis of and reply to Dr. Felix Krueger's papers on musical consonance and dissonance, together with much new experimental material. It is undoubtedly one of the most important contributions to the theory of consonance. Dr. von Hornbostel has a brief paper on comparative studies in the psychology of acoustics and music.

J. ARTHUR THOMPSON, M. A. *Heredity*. London: John Murray. New York: G. P. Putnam's Sons, 1909. Pp. xvi, 605. \$3.50 net.

Reserved for more extended notice.

EDWARD L. THORNDIKE. *Educational Psychology*. Second edition, revised and enlarged. New York: Teachers College, Columbia University, 1910. Pp. 248. \$1.50 net.

In the revised edition Professor Thorndike has followed the same general plan as in the first edition, but has greatly amplified the discussion and brought it up to date. Except in the general scheme it is almost a new work. It is intended for students in advanced courses, and attempts to apply the methods of exact science to the problems of the mental natures of individual men and the causes of their differences. The author promises a second volume, dealing with the nature of man as a species, taking up such problems as instinct, habit, learning, practice, memory, fatigue and the like.

WILLIAM MORTON WHEELER, Ph.D. *Ants: Their Structure, Development and Behavior*. New York: The Columbia University Press, The Macmillan Company, Agents, 1910. Pp. 663. \$5.00 net.

One of the most important subjects in comparative and educational psychology is that of instinct, yet few terms are so loosely and vaguely used in current educational discussions. Since the dawn of history man has marveled at the wonderfully ingenious adaptations of the ant, and its behavior has long been pointed out as the acme of instinctive activity. Professor Wheeler has given us a veritable encyclopedia of the ant, including a description of the structure of ants, their development, the history of ant study, the classification and distribution of ants, fossil ants, seventeen chapters on the habits of various species of ants and three chapters on the sensations of ants, their instinctive behavior, and their ability to learn. It is perhaps the most careful and extended study of instinctive behavior in any language.

GUY MONTROSE WHIPPLE, Ph.D. *Manual of Mental and Physical Tests A Book of Directions Compiled With Special Reference to the Experimental Study of School Children in the Laboratory or Classroom*. Baltimore: Warwick & York, Inc., 1910. Pp. 534. \$2.50.

The crying need in education today is units of measurement. The old, slipshod, rough-and-ready methods of estimating a child's ability or ac-

complishment must give way to more exact determinations. In the present manual Professor Whipple has brought together a large number of the most important mental and physical tests, has indicated their source and sketched their development, has furnished clear and detailed directions for carrying them out, has presented and discussed representative results of previous investigators, and has supplied copious references to the literature of each test. When our present hap-hazard methods of grading and promotion shall have yielded to the requirements of experimental pedagogy Professor Whipple's book will be found on the desk of every teacher, principal and superintendent. Meantime it is invaluable for all who are making careful studies of mental growth.

# ACCURACY IN SCHOOL CHILDREN. DOES IMPROVEMENT IN NUMERICAL ACCURACY "TRANSFER"?\*

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*London, England.*

## SUMMARY.

Pupils in four different schools were studied with reference to the question, "Does improvement in accuracy of numerical computation 'transfer' to arithmetical reasoning?" The pupils of each school were divided into two equal groups on the basis of preliminary tests in working arithmetical problems. One of these groups was practised in working rule sums, while the other was occupied with history, drawing, etc. After a certain number of days of practise further sets of problems were used to test both groups in arithmetical reasoning. In the first school tested there was no evidence of 'transfer,' but in the second, third and fourth schools the practised section showed certain improvements in arithmetical reasoning.

Many more experiments of this sort are necessary before definite conclusions can be drawn, but from the present investigation it would seem that some sort of connection may exist between improvement in numerical computation and mathematical reasoning. The results are too irregular to warrant the conclusion of any definite 'transfer,' but the improvement in reasoning may be due either to release of mental energy resulting from improved facility in computation, or to the association established between the two kinds of function usually at work together, whereby continuance of the one involves greater readiness for the other. It is hoped that others will be stimulated to repeat the tests and to carry them farther.

## I. INTRODUCTION.

It is a reproach frequently made by educationists against psychologists that the latter do not apply themselves to the

\*The experiments here described in detail were given in outline in a paper on the "Faculty Doctrine," read at a joint meeting of the Aristotelian and British Psychological Societies and of the *Mind* Association, in London, July, 1910.

solution of problems which have direct and immediate bearings on educational theory and practice; and it is further complained that, however true many psychological results may be, they are nevertheless, irrelevant, as far as education is concerned. Perhaps some justification for the complaint may be conceded; but the educationist, on his side, may in fairness be required to remember that educational psychology is not the whole of psychology, and further, that no science can, or ought to, be expected to issue in practical directions at every step of its growth and progress.

## II. THE PROBLEM STATED.

Among the practical questions which are hotly debated by educationists today, there are to be found problems whose solution will not only be of importance to the educator, but may throw some light also upon psychological and epistemological questions—such an one is that of “accuracy.”

### i. *Its pedagogical aspect.*

It is impossible for a visitor to ask questions in schools as to the *rationale* of methods and processes adopted by teachers without continually receiving answers which imply the “faculty doctrine” in its extremest form. If one asks, for example, why a high standard of numerical accuracy is demanded in arithmetical exercises, it is relatively rare that one receives an answer based upon the practical inconveniences which arise from inaccurate results.

It is much more common to be told that children ought to be accurate in arithmetic because the *habit* of accuracy is so important. And when one asks why a much higher standard of proficiency in numerical computation is demanded in school than, in most cases, life is likely to require, an answer is given somewhat in the following form, “Well, you see, it makes the child accurate all round.” If, at this point, one asks whether improvement in numerical accuracy will improve accuracy in drawing or accuracy in the sight reading of music, there is apt to be some hesitation and search-

ing of heart. But if the question be put, "Will it make the boy more accurate in other arithmetical operations?" the answer is unhesitatingly in the affirmative. This then is our problem today. Is there such a thing as a habit of accuracy? Is accuracy a "faculty"? Will accuracy, developed by training the child in one school subject, be transferred to another in which he has not been trained? Will it be transferred even to other aspects of the same school subject, e. g., arithmetic? May it not be found that even this well-known "subject" is not so much one subject as a congeries of independent operations?

That these questions are not superfluous at the present time may be seen by the alarming variety in the views held by competent educationists. Mr. J. L. Paton, in an article in the *Educational Times* for July, 1907, writes accuracy as one of the school virtues which are in reality great life virtues exemplified and enforced in small matters—the implied argument being that accuracy in school work will tend to accuracy in the work of life, whatever that may be, and *à fortiori*, that accuracy in one branch of school work will be reflected in the accuracy of another.

The opposed view is very strongly put in Chapter VIII. of Dr. F. H. Hayward's *Education and the Heredity Spectre*; he says that the "dogma of formal training—faith in which constitutes the greatest educational superstition of today—needs to be statistically *refuted*" (italics mine). It would be better, perhaps, to ask that the doctrine might be statistically tested, for it sometimes happens that figures collected to overthrow a doctrine are found to establish it.

If these discussions and differences were to be found only in academic realms and in polemic works of small circulation they would be of relatively small importance; but that is not the case. The inspector and the school-master take a hand, especially in arithmetical questions, either asserting that improvement in mechanical numerical accuracy will affect a boy's arithmetical reasoning powers adversely, or

that accuracy in one will lead to accuracy in the other.

It not unfrequently happens that both parties to the dispute—when experimental inquiry is made—are found to be right; it sometimes happens that they are both found to be wrong. I propose, however, to leave all inferences until after the method and results of the experimental work have been presented.

ii. *Its psychological aspect.*

The grouping of mental operations into classes has always been found convenient, and is likely, notwithstanding animadversions about 'faculty psychology,' to go on. Is 'accuracy' a generic name which may fairly be applied in this sense? Is accuracy a faculty? Is there a habit of accuracy involving more than the operations whose accuracy has been increased by training?

iii. *Its epistemological aspect.*

What relationship must be shown to exist between two powers or functions of the same mind before we are entitled to call them part of the same 'faculty' or group of similar functions? Suppose we find high positive correlation between two mental operations, what sort of relationship may be inferred between them? Have we a guarantee of any relationship beyond what a metaphysician might call a mere "togetherness"?

The educationist, let us remember, when he hears psychologists and others talk of correlations, thinks that the establishment of high positive correlations means much more than this. It is useful, doubtless, for a teacher, especially at examination times, to be able to tell from a test in one or two subjects or parts of subjects what the class will be able to do in others. Mere "togetherness," if quantified, will enable this to be done. And even that is not without value.

But what the educationist is apt to assume high positive correlation to mean—and not only the educationist—is that a relationship exists between two functions of such a nature



that improvement in the one implies improvement in the other (subject to certain conditions as to fatigue and saturation point), and that decay of the one implies decay of the other.

For if there is not causal dependency, it is frequently thought that there is some central or common factor to whose existence the positive correlation is due, the training of which would therefore be common to the two operations.

### III. GENERAL PLAN OF THE EXPERIMENTS.

The general method adopted was the same throughout, though there were minor modifications as to the number and difficulty of the exercises in different schools. In each case a whole class, working according to the same syllabus of work and under one teacher, was divided into two equal groups. The division was effected on the results of several tests in problematical arithmetic. In order that the natural ability of the children rather than their memory of recent teaching should be tested in these exercises, it was arranged that no problems should be given in a form with which the pupils were well acquainted. The tests were marked solely with reference to the accuracy of the arithmetical reasoning and entirely without reference to the accuracy of the numerical computation. No attention was paid to the *right answer*; marks were given with reference to the process only.

When the two equal groups had been obtained, one of them was practised in a series of exercises in 'rule' sums which every child knew how to do; the other group being meanwhile engaged in some other branch of school work. In every other respect the curriculum for both groups was precisely the same during the period of the experiment. I need, perhaps, hardly say that no other arithmetical work was done during the time the experiment lasted.

Finally, the two groups, namely, the one practised in accurate numerical computation and the one not so practised, were placed together again, and final tests were given in

arithmetical reasoning. There had been, in all cases, a considerable improvement in the accuracy of numerical computation during the series of practice exercises. How far was this improvement of accuracy in arithmetical computation transferred to accuracy in arithmetical reasoning? Did the practised or non-practised groups do better work when the groups worked the same test exercises at the end?

The above issue is, pedagogically, the most important of all those on which the following experiments throw light; it would be referred to in educational works as the question of the transfer of improvement in accuracy.

These experiments, however, help us towards the answer to another question which is primarily epistemological though of great importance to psychology. Let us find the correlation between the two forms of accuracy—accuracy of arithmetical reasoning and accuracy of numerical computation. If it is found to be highly positive, we shall suppose either that one function causes the other, or that there is a common factor in the two functions, or that both functions are the result of some prior quality or power which develops approximately equally in both these directions, or, finally, that the high correlation is a mere togetherness without relations or interdependence.

The two former hypotheses are capable of verification by means of our experiments. If one causes the other, then improvement in one should lead to improvement in the other. If there is a common factor, improvement in one should (so far as the common factor goes) lead to improvement in the other.

To find the correlation between accuracy in numerical computation and accuracy in arithmetical reasoning, it would seem, at first, a satisfactory procedure to correlate the marks for the preliminary problematic lists and the practice exercises in rule sums which were worked subsequently by one of the two equal groups. But it would be unsatisfactory to correlate two series obtained under dif-

ferent conditions as to time and curriculum. If one desires to find a correlation which shall be free from these disturbing influences, it is better to take the exercises on which it is to be based side by side and under the same school conditions. This, therefore, was done. Tests in rule sums, which every child knew *how* to do, were given *pari passu* with the tests in arithmetical reasoning. So that the conditions as to fatigue (if any) might not be more favorable to one sort of test than to the other, in one school the problem and rule sums were given alternately first and second. This variation produced no change in the results; it appeared to be an unnecessary precaution.

Having found the correlation between the two functions which, I may say in advance, is highly positive, we may refer to the tables which show the transfer (if any) of improvement in accuracy from one function to the other. If the result is negative, small, or doubtful, we are, on empirical grounds, faced by very serious limitations to the inferences we may draw from the fact of high positive correlation between two functions.

A second point, rather, perhaps, of pedagogical than of psychological interest, is the following: Besides the most important issue, namely, the decision as to the question of the transfer of improvement in the accuracy of numerical computation to accuracy in problematic reasoning, there is the subsidiary one: How far is the improvement in numerical accuracy gained during the practise exercises transferred to the numerical computation within the final sets of problems worked? For it is frequently thought, even by competent opinion, that practise work in accuracy of this kind is practically useless when the pupil sets to work on problematic sums.

#### IV. FIRST SERIES OF EXPERIMENTS. SCHOOL "S."

A first series of experiments was carried out in a municipal girls' school situated in a poor neighborhood, with Standards VI. and VII. of an average age at the beginning of the

series of 13 years 2 months. The teacher of the class was disposed to throw emphasis on the problematic rather than the computational side of arithmetic. The problems she was accustomed to give were difficult for this type of child and the tests set are hard. I mention this because the schools selected by me to do this work had different attitudes towards arithmetical teaching, for I was anxious to avoid finding correlations and other results which might have been dependent rather on the trend of the teaching than on the natural abilities of the children.

I avoid dealing with the question as to how far the trend of the teaching *can* obscure or overcome natural correlations. I am of opinion — an opinion not widely shared — that its power is rather limited, but I thought it best to vary my examples in this respect so as to strengthen my conclusion if the results appeared unaffected by the educational *milieu*.

This work was done in the spring of 1909. A brief chronology of the experiment with some specimens of the tests and exercises follows:—

Tuesday, March 30th.

10.15 A. M. to 10.35 A. M. All the classes worked arithmetical problems.

10.40 A. M. to 11.00 A. M. All the class worked rule sums.

Thursday, April 1st.

10.15 A. M. to 10.35 A. M. All the class worked arithmetical problems.

10.40 A. M. to 11.00 A. M. All the class worked rule sums.

Friday, April 2nd.

10.15 A. M. to 10.35 A. M. All the class worked arithmetical problems.

10.40 A. M. to 11.00 A. M. All the class worked rule sums.

The class was now divided into two equal groups on the basis of the marks for reasoning obtained in working the problem papers.

Tuesday, April 6th.

10.15 A. M. to 10.55 A. M. One of the two groups — hereafter called the practised group — worked rule sums. The other group studied history.

At this stage of the experiment the Easter holiday intervened, after which the exercises were resumed.

Tuesday, April 20th.

10.15 A. M. to 10.55 A. M. The practised group worked rule sums:  
the non-practised group did drawing.

Thursday, April 22nd.

10.15 A. M. to 10.55 A. M. The practised group worked rule sums:  
the non-practised group did drawing.

Friday, April 23rd.

10.15 A. M. to 10.55 A. M. The practised group worked rule sums:  
the non-practised group did drawing.

The two groups were now placed together again, and on

Tuesday, April 27th.

10.15 A. M. to 10.55 A. M. All the class worked a test in problematic arithmetic; a longer paper of questions was set on this occasion than during the preliminary problematic tests.

i. *Specimens of Tests and Exercises with the Method of Marking.*

(a.) *A Set of Arithmetical Problems.*

1. A certain grocer gains  $\frac{3}{4}$ d. on every 4 ounces of coffee which he sells; what would he gain by the sale of  $11\frac{1}{2}$  cwt.s.?
2. A woman earns three times as much as a boy and a man twice as much as a woman. If the daily wages of a man, a woman and a boy amount to 19s. 2d. what are the daily earnings of each?
3. A tank is full of water. After  $\frac{1}{3}$  of its contents has been drawn off,  $\frac{1}{5}$  of the remainder is also drawn off. If 18 gallons are then left in the tank, what does it hold when full?

As already stated these tests were marked so as to give credit for arithmetical *reasoning* only, irrespective of the correctness of the answer numerically.

But a mere glance will show that not all the above sums are equal in difficulty. How shall we mark so that our units shall be approximately equal and that the obviously more difficult sum shall receive an adequately higher mark? I suggest the following method with some confidence (though I do not consider it perfect), as I have worked with it for some years with satisfactory results.

Let us consider each necessary rational 'step' as worthy of *one* mark. In the first problem, for instance, it is essential to the solution (at the mental stage reached by these children), (1) that the ounces and the hundredweights should be reduced to the same denomination, either the ozs. to cwts. or the cwts. to ozs.; (2) that the number of times which 4 ounces is contained in the total weight should be found; (3) that the gain on each 4 ounces should be multiplied by the quotient thus obtained. This gives us a total of 3 rational steps or marks for the first problem.

The second problem is much more difficult. To solve this the children require to regard (1) the boy as possessing one share, (2) the woman as possessing three times as much as the boy, namely, three shares, (3) the man as possessing six times as much as the boy, namely, six shares. Then (4) the shares must be added, and (5) the 19s. 2d. must be divided by the total number of shares. The quotient is the boy's wage. Thus we have a total of 5 marks for reasoning for the second problem. The multiplication of the boy's wages is regarded as rationally identical with the earlier steps, so no additional marks are awarded.

The third problem is resolved by the following rational steps: (1) The  $\frac{1}{3}$  drawn off must be subtracted from unity. (2)  $\frac{2}{3}$  of the remainder must be found. (3) The total fraction drawn off must be found. (4) The fraction of the whole now remaining must be calculated. (5) The fraction must be equated with the gallons left in the tank. (6) From the value of the given fraction in gallons the value of unity in gallons must be calculated. This gives a total of six marks for the rational steps of the third problem.

I need hardly say that any rational step necessary towards, or on the way towards, a correct solution would have received a mark; but, in practice, the marks actually obtained by the pupils of this class were obtained for some or all of the above 'steps'. It is not maintained that this system of marking is theoretically perfect, but it gives steady

and reliable results, and is a system which teachers readily appreciate and understand. This latter condition seems to me one of the utmost importance in all research work on a large scale in educational psychology.

(b) *A Test in Rule Sums worked immediately after a Test in Arithmetical Problems.*

- (1). Divide 3 cwt. 2 qrs. 21 lbs. 7 ozs. by 35.
- (2). Divide  $\frac{1}{2} \times \frac{1}{3} - \frac{1}{4} \div 3$  1-23.
- (3). Express 1 cwt. 2 qrs. as the fraction of 2 cwt. 3 qrs. 4 lbs.

(c) *A Practical Exercise in Rule Sums given to the practised group only.*

- (1). £1398 7s. 0 $\frac{3}{4}$ d.  $\div$  39.
- (2). Take £77 2s. 6 $\frac{3}{4}$ d. from £1000 and multiply the answer by 25.
- (3). What is the value of 7-9 of £6 18s. 9d.
- (4). 3 $\frac{1}{4}$  of 5-7 of 9 3-15 of 3 $\frac{2}{3}$ .
- (5).  $\frac{5}{8}$  of a ton + 3-7 of a quarter.
- (6). (.007 + 5.01 - 1.05)  $\times$  .068.

The method of marking adopted for 'accuracy' in computation, though extremely laborious, was, in principle, extremely simple. It was intended that no sum should be set in these exercises which the children did not know *how* to do; but of course, though the processes were well known, there was much variation in accuracy of computation. It is obvious to any one who has kept records of arithmetical work from week to week that the usual method of marking sums 'right' or 'wrong' and allowing for each sum so many marks, all or most of which are lost if there is any numerical inaccuracy, will not give us a series of results which will adequately show improvement in accuracy. A child with one or two figures wrong in several sums may really have worked more accurately than another child who has all the sums right but one, provided that that one be wrong in many places.

Further, a child may make much improvement, even though its total number of sums right does not increase. Having these considerations in mind it was decided to give

one mark for each correct unit of addition, subtraction, multiplication and division. Thus, if £1398 7s. 0¾d. be divided by 39, the first unit is a unit in division. A three in the quotient receives one mark. The multiplication of 39 by 3 receives three marks; thus, 3 times 9 are 27, the seven receives a mark; 3 times 3 are 9, the 9 receives a mark, and if the + 2 from the 27 is added correctly (teachers know how often 'carried numbers' are added incorrectly) another mark is given. The subtraction of 117 from 139 is assessed in a similar way; each unit process receives one mark. Some—a very few—able children telescope processes which average children work out at greater length, but their units are always calculated on the most generous basis. A child on this method of marking does not lose all the rest of the marks for that sum because one number early in the sum is found wrong, even though subsequent operations on that number lead to further errors in the sum as usually understood. He may not really have made any *more* errors; it is necessary to go through the sum, unit by unit, to see if he has or has not. Doubtless some of my readers have said to themselves, "Why not use 'reckoning books', where the unit of calculation would be so much more easily estimated?" I did not do this, since it would have introduced an element of disturbance in the normal work of the children; and further, because teachers are not usually convinced by experiments which seem to them something outside and apart from ordinary school-work.

## ii. *Results.*

The marks for accuracy in arithmetical reasoning in the three preliminary tests were added together, and the marks for accuracy in numerical computation in the tests worked side by side (immediately after) with the problems in reasoning were also added together. The results follow:



*Table I., showing the general correlation between*  
 (a) *accuracy in reasoning,*  
 (b) *accuracy in numerical computation.*

Marks for Reasoning.	No. of Children.	Average Mark for Reasoning Per Child.	Av. Mark for Numerical Computation Per Child.
Over 30	2	32.5	306.0
25 to 30	9	28.0	282.6
20 to 25	4	21.7	284.2
15 to 20	9	18.2	267.2
10 to 15	8	11.6	224.0

It is fairly obvious from even a brief inspection of the above table that children who are good at arithmetical reasoning are usually good at numerical computation also, i. e., the correlation is positive. It is wise, however, to find a more definite value than can be obtained from the table. The children were placed on a list thus:

Name (Initials Only.)	Marks for Reasoning.	Marks for Computation (To the nearest ten.)
1. A. P.	33	31
2. E. C.	32	30
3. A. B.	30	29
.....	..	..
32. R. D.	10	20

Then the Pearson formula  $r = \frac{\sum x y}{n \sigma_1 \sigma_2}$  was applied to the individual cases and 'r' was found to be + .68.

May we from this result presume that the two powers, accuracy in arithmetical reasoning and accuracy in numerical computation, are so related that improvement in one of them may be found to result in improvement in the other, that is, that accuracy transfers? Let us proceed to test the matter empirically.

After the material for correlation had been obtained the class was divided into two equal groups on the basis of the marks obtained in the three preliminary tests of arithmetical reasoning.

The result follows:

*Table II., showing the division into two equal groups.*

GROUP A.		GROUP B.	
Name (Initials Only.)	Marks for Reasoning.	Name (Initials Only.)	Marks for Reasoning.
A. P.	33	E. C.	32
L. F.	28	A. B.	30
D. W.	28	E. R.	30
E. R.	28	J. B.	28
M. D.	27	L. M.	27
M. C.	26	A. W.	24
E. A.	21	D. Hd.	21
A. R.	20	D. Hn.	21
M. J.	19	M. R.	19
R. S.	19	C. B.	19
W. O.	18	E. W.	18
E. W.	16	E. G.	16
L. J.	14	F. D.	13
M. O'H.	12	J. B.	12
D. G.	11	A. H.	11
L. P.	10	R. D.	10

The group selected to do the practice exercises in 'rule sums' was determined by 'chance', which fell upon Group B, hereafter called the 'practised' group. A record of units of accuracy in computation was kept during the course of the practice exercises. The improvement shown by the practised group in numerical accuracy may be seen from the following table:

*Table III., showing the improvement in numerical accuracy of the practised group.*

Marks for Preliminary Tests in Reasoning.	No of Children.	Marks for Numerical Accuracy in the Practice Exercises.			
		Av. 1st Ex.	Av. 2nd Ex.	Av. 3rd Ex.	Av. 4th Ex.
30 and over.	1	196	207	207	251
25 to 30	4	178	195	214	233
20 to 25	3	218	219	232	218
15 to 20	4	171	181	193	177
10 to 15	4	145	169	145	128

In the fourth practice exercise one sum was set, which D. Hn. in the third section, E. W. in the fourth section, and

J. B. in the fifth or lowest section, could not attempt. This was contrary to the scheme of the work and unfortunate, as it unduly reduced the marks in those sections. There is no doubt, however, from the general trend of the numbers, except in the lowest section, that considerable improvement was taking place.

It now remains to present the results of the work in arithmetical reasoning of the two 'groups' after they had been put together again and worked a further test.

*Table IV., showing the marks for arithmetical reasoning of the practised and non-practised groups compared in corresponding sections.*

Marks for Three Preliminary Exercises in Arithmetical Reasoning.	Non-Practised Group A.			Practised Group B.		
	No. of Children.	Av. Mark Per Child in Preliminary Exercises	Av. Mark Final Exercise.	No. of Children.	Av. Mark Per Child in Preliminary Exercises	Av. Mark Final Exercise.
30 and over.	1	33.0	15.0	1	32.0	16.0
25 to 30	5	27.4	14.6	4	28.7	13.5
20 to 25	2	20.5	7.5	3	22.0	7.0
15 to 20	4	18.0	9.2	4	18.0	9.2
10 to 15	4	14.2	6.0	4	14.0	4.2

Taking the groups as wholes, we find that Group A scores an average mark of 20.6 (mean variation 5.8) in the preliminary tests, and 10.2 (mean variation 3.6) in the final test; whilst Group B scores 20.6 (mean variation 5.9) and 9.1 (mean variation 4.7).

It is difficult to resist the conclusion that the group practised in accuracy of computation shows no improvement over the group not thus practised, i. e., there appears to be no transfer of improvement in accuracy from arithmetical computation to arithmetical reasoning. That is the main problem; but a secondary issue arises as to the value of improvement in numerical accuracy in rule sums. Does this improvement transfer to the numerical accuracy with which 'problems' are worked?

Both sets of problems, the preliminary and the final tests, were marked for numerical accuracy. In this school, the

only units of accuracy counted in this marking were those which were found in steps necessary to the solution of the problem. This is not satisfactory scientifically, but it gives the result a practical value, for teachers wish to know whether the practised children can therefrom be expected to get more of their problems right. The results follow:

*Table V., showing the numerical accuracy of groups A and B compared in the working of the preliminary and final problems.*

Marks for Numerical Accuracy in Preliminary Problems.	Non-Practised Group A.			Practised Group B.		
	No. of Children.	Av. Mark for Numerical Accuracy in Three Sets of Preliminary Problems	Av. Mark for Numerical Accuracy in Final Set of Problems.	No. of Children.	Av. Mark for Numerical Accuracy in Three Sets of Preliminary Problems	Av. Mark for Numerical Accuracy in Final Set of Problems
Over 180	2	189.0	108.5	2	187.0	124.5
170 to 180	2	173.5	105.5	0	.....	.....
160 to 170	2	164.0	73.5	0	.....	.....
150 to 160	3	158.0	80.0	6	155.2	107.0
120 to 150	2	131.0	67.0	4	138.0	101.0
Below 120	4	105.5	71.0	4	92.7	*49.5

It is not fair to conclude from this experiment that no amount of improvement in numerical accuracy would transfer to accuracy in numerical reasoning, but only that the improvement shown in this case was insufficient to transfer. There is a presumption that it might not, since there is a clear transfer of improvement in numerical accuracy itself from rule sums to problems. I should myself have been prepared to find a slight improvement in the arithmetical reasoning, not perhaps from direct transfer, but from the fact that, the numerical work of the problems having become more accurate and mechanized in the one group than the other, a

\*The children in this group, F. D., R. D., C. B., and A. H., showed no continuous improvement in the practice exercises in numerical accuracy; the continued practice at short intervals seems to have diminished their arithmetical capacity, which is not altogether an unexpected result with very weak pupils. In the other groups there seems to be a clear gain in numerical accuracy in the problematic work.

larger share of the pupil's available energy could have been given to the method of solving the problems, i. e., to the arithmetical reasoning involved. But this does not appear to have been the case.

#### V. SECOND SERIES OF EXPERIMENTS. SCHOOL "B."

A second series of experiments was carried out in a municipal girls' school situated in a very poor neighborhood. They were done with a Standard II. class of a high average age, namely, 10 years. The school was one in which numerical accuracy had long been a marked feature of the work, whilst the problematic aspect of arithmetic had received somewhat less attention. It will be remembered that the general plan of the experiments requires the tests and exercises to be taken in schools in which the conceptions of good arithmetical work differ.

A brief chronology of the experiment follows:

Tuesday, April 20th, 1909.

10.00 A. M. to 10.20 A. M. All the class worked arithmetical problems.

10.20 A. M. to 10.35 A. M. All the class worked rule sums.

Thursday, April 22nd.

10.00 A. M. to 10.15 A. M. All the class worked rule sums.

10.15 A. M. to 10.35 A. M. All the class worked arithmetical problems.

Friday, April 23rd.

10.00 A. M. to 10.20 A. M. All the class worked arithmetical problems.

10.20 A. M. to 10.35 A. M. All the class worked rule sums.

Tuesday, April 27th.

10.00 A. M. to 10.15 A. M. All the class worked rule sums.

10.15 A. M. to 10.35 A. M. All the class worked arithmetical problems.

On the results of the work in arithmetical problems, or, rather, on the number of correct rational processes in the

working of the problems, the whole class was divided into two equal groups, and from 9.50 A. M. to 10.30 A. M. on Wednesday, April 28th, Thursday, April 29th, Friday, April 30th, Tuesday, May 4th, Thursday, May 6th, and Friday, May 7th, Group B—hereafter called the practised group—worked exercises in rule sums for the purpose of producing improvement in numerical accuracy; whilst Group A—hereafter called the non-practised group—did exercises in drawing.

Next week the two groups were put together again, and, from 10.00 A. M. to 10.20 A. M. on Tuesday, May 11th, worked a test in problematic arithmetic. A second test was given at the same time on Thursday, May 13th; a third on Friday, May 14th, and a fourth on Tuesday, May 18th. After the preliminary tests, throughout the practice period, and during the final tests, no arithmetic was done by either group except the rule sums worked by Group B on the dates given.

### i. *Specimens of Tests and Exercises.*

#### (a) *A Set of Preliminary Problems.*

- (1). How many cakes at 7 for 6d. can I buy with 14s. 6d.?
- (2). A man had £5. He gave a quarter of it to his son and 19s. 6d. to his daughter. How much had he left for himself?
- (3). What shall I pay for three pounds of tea at 1s. 8d. a pound, and two pounds of coffee at 1s. 3d. a pound?
- (4). In a wood there were 125 oak trees, 78 beech trees, half as many elm trees as there were beech trees, and 30 less ash trees than oak trees. How many trees were there altogether?

#### (b). *A Set of 'Rule' Sums worked side by side with a Set of*

#### *Preliminary Problems.*

- (1). Divide £1 19s. 11½d. by 12.
- (2). Find 8 times £3 13s. 4d.
- (3). From £13 6s. 11½d. take £9 19s. 3¾d.
- (4). £1 16s. 11½d. + £2 7s. 6d. + 15s. 9¾d. + £1 0s. 10½d. + £3 13s. 11½d.

The rule sums employed for practice exercises were similar, but more in number. The problem papers set in the final tests were intended to be of the same difficulty as those set in the preliminary tests, but they were really rather more difficult.

## ii. *Method of marking.*

As before, the marks for reasoning depended on the logical steps necessary to the solution of the problem. Thus, in the case of the first sum in the set of problems given above, it is necessary to find how many sixpences there are in 14s. 6d., and then to multiply this number by 7. In the second problem, it is necessary to divide £5 by 4, to add the quotient to the daughter's share and subtract the sum from £5. This gives us 3 steps or marks. Another method, which subtracts the quotient from £5 and subsequently subtracts 19s. 6d. from this remainder, also requires three logical 'steps' or processes and equally receives 3 marks.

The marking for numerical accuracy in rule sums proceeded on the same basis as before—one mark was given for every accurate unit of addition, subtraction, multiplication or division.

In marking the numerical accuracy of the final set of problematic tests in this school a mark was given for every correct numerical unit whether it occurred in work necessary to the solution or not.

## iii. *Results.*

I propose first to show a general table of correlation between accuracy of arithmetical reasoning and accuracy of numerical computation. The tests on which the figures are based, it will be remembered, were worked side by side, under the same school conditions.

*Table VI., showing general correlation between*  
 (a) *accuracy of arithmetical reasoning and*  
 (b) *accuracy of numerical computation.*

Marks in 4 Preliminary Tests in Arithmetical Reasoning.	No. of Children.	Average Mark for Reasoning.	Average Mark for Numerical Accuracy.
Over 35	4	36.5	198.0
35 to 30	5	32.6	195.2
30 to 25	8	28.8	184.5
25 to 20	7	23.2	184.1
20 to 15	9	18.1	148.6
15 to 10	2	12.0	121.5
10 to 5	7	9.0	94.3
5 to 0	1	5.0	39.0

It is obvious from the above table that the positive correlation is considerable, but it was thought advisable to work it out from the 43 individual cases by the Pearson product—moment formula. It reaches the high figure of +.79.

I am unable to show the improvement in numerical accuracy made by the practised group during the progress of the practice exercises themselves. Both the Head Mistress of the school and the Teacher of the class assert that it was considerable. Unfortunately the sums were only marked 'right' and 'wrong' and the children's worked papers were not preserved.

But that some improvement in numerical accuracy occurred and, moreover, transferred itself to the numerical accuracy of the final problematic work is obvious from the following table:

*Table VII., showing numerical accuracy of Groups A and B*  
 (a) *in the preliminary problem tests,*  
 (b) *in the final problem tests.*

Marks for Numerical Accuracy in 4 Pre- liminary Problem Tests.	Non-Practised Group A.			Practised Group B.		
	No. of Children.	Av. Mark 4 Prelimi- nary Tests.	Av. Mark 4 Final Tests.	No. of Children.	Av. Mark 4 Prelimi- nary Tests.	Av. Mark 4 Final Tests.
Over 150	7	171	139	7	163	142
150 to 100	8	129	110	8	120	117
100 to 50	4	82	76	4	76	74
50 to 0	3	42	67	3	37	74



It appears from the above table that, whereas the numerical accuracy of the non-practised group was decidedly superior to that of the practised group in the preliminary tests (the *equality* of the groups was based on their arithmetical reasoning, it will be remembered), yet, notwithstanding this, after the practice period, the position of the two groups, section by section, is reversed. Nearly all the sections appear to have gone down; a study of the possible numerical units and of the problematic difficulty in the preliminary and final tests show this to be appearance only. But even if it were so, we are concerned solely with the comparison of the final work of the two groups, and it is evident from these comparisons that Group B is the better. If we calculate the final results of each section of each group as a percentage of its preliminary result, we find the highest section of Group B scored 87%, whilst the corresponding section of Group A scored 81%; the second section of Group B scored 87% against the 85% of the second section of Group A; the third section of Group B scored 97% as compared with 93% for the third section of Group A; whilst the lowest section of Group B scored 200% as against the score of 159% for the lowest section of Group A. But it is not quite satisfactory to estimate improvement on numerical accuracy in this way, unless we can be fairly certain that the two groups would *attempt* an equal number of problems.

The more important question—the issue to which the experiment was mainly directed—was not, however, whether numerical accuracy was transferred from rule sums to problems, but whether improvement in numerical accuracy was transferred to accuracy in arithmetical reasoning.

The following table helps us towards a solution:

*Table VIII., showing accuracy of arithmetical reasoning of Groups A and B in*  
*(a) the preliminary problems. (b) the final problems.*

Marks for 4 Preliminary Tests.	Non-Practised Group A.			Practised Group B.		
	No. of Children.	Av. Mark Prelimi- nary Tests.	Av. Mark Final Tests.	No. of Children.	Av. Mark Prelimi- nary Tests.	Av. Mark Final Tests.
Over 35	2	37.0	33.5	2	36.0	35.0
35 to 30	2	32.5	32.0	3	32.7	32.7
30 to 25	5	29.0	28.8	4	28.7	28.0
25 to 20	3	24.0	23.3	4	*22.5	27.7
20 to 15	5	18.6	18.8	4	17.5	16.0
15 to 5	5	9.0	12.2	5	9.8	15.4

\*'E. F.', one of the children in this section, had been absent from school for some time previous to the preliminary tests and consequently worked these below her usual form; she was, according to the Head Mistress, improperly placed in the grouped and ordered lists.

Considering the groups as wholes, we find that, whilst Group A obtains an average mark of 22.5, with a mean variation of 7.9 in the preliminary tests and 22.7 in the final tests with a mean variation of 7.7, Group B obtains 22.5 (mean variation 7.7) and 24.2 (mean variation 7.4) in the preliminary and final tests respectively.

In this school the practised group and the non-practised group, which each scored 494 units of correct reasoning in the preliminary problem tests, are, as in the preceding school, *not* alike in the final tests, for now the former scores 532 units as against 499 for the latter. This is a reverse relationship to that found in School 'S.' It seems to me, however, that it would be unsafe to conclude that any transfer of accuracy had taken place unless, section by section, the children of corresponding ability throughout the two groups showed clear and consistent gains on the part of the practised group. In this case two of the non-practised sections are superior to the practised in the final tests.

## VI. THIRD SERIES OF EXPERIMENTS. SCHOOL "I."

A third series of experiments was carried out in a municipal girls' school differing in type from the two previous

ones. It was situated in a rather good neighbourhood, but the arithmetical work of the children, both with respect to their capacity to solve problems and their numerical accuracy, was known and acknowledged by the teachers of the school to be low. Psychologists will see at once how important it is, in work of this kind, in which improvement is involved, to select observations from those who are at very different stages with respect to their *saturation point* for the mental operations in question. From a comparison with children of corresponding social class in other schools, I was well aware that these children were below saturation point in both accuracy of arithmetical reasoning and accuracy of numerical computation. The following is a brief chronology of the experiment:

On Tuesday, April 27th, from 9.40 a. m. to 10.0 a. m., the whole of a Standard III. class, of an average age of 10 years 4 months worked a test in arithmetical problems, and from 10.0 a. m. to 10.20 a. m. worked an exercise in rule sums. On Thursday, April 29th, the class worked further tests in problems and rule sums at the same times as before. On Friday, April 30th, further tests of similar character were worked at corresponding times. Each child had now worked three sets of problematic tests and three sets of rule sums. The class was then divided into two equal groups on the basis of the marks for reasoning obtained in the working of the problem papers; and on Tuesday, May 4th, from 9.40 a. m. to 10.20 a. m. one of the groups—hereafter called the practised group—worked ‘rule’ sums; the other group did an exercise in drawing. On Thursday, May 6th, at the same time in the morning, the practised group worked a second exercise in ‘rule’ sums; the non-practised group studied geography. Again, on Friday, May 7th, on Tuesday, May 11th, on Thursday, May 13th, and on Friday, May 14th, at the same time in the morning as before, the practised group worked further exercises in rule sums whilst the non-practised group studied history or geography, or were exercised in drawing.

Next week, on Tuesday, May 18th, the two groups were put together again, and, from 9.40 a. m. to 10.0 a. m., all the class worked a test in problematic arithmetic. A second test was given at the same time on Thursday, May 20th, and a third test on Friday, May 21st, also from 9.40 a. m. to 10.0 a. m.

i. *Specimen Sets of Tests and Exercises.*

(a) *A Set of Problems in Arithmetic.*

1. A man bought a chair for 30 shillings. He paid 9s. 3d. for a new cushion and 1s. 6d. for having it put on. He then sold the chair for £3 2s. 0d.; how much did he gain?
2. In a tramcar there were 29 people. At the first stop 8 got out and 5 got in; at the second stop 13 got out and 10 got in. How many were in the car then?
3. In a wood there were 972 trees, half were oak and a quarter elm, whilst the remainder were ash. How many ash trees were there?

(b) *A set of Rule Sums, worked during the*

*Preliminary Tests by Both Groups.*

1. £.	s.	d.	2. 3,649 × 79
35	10	2¾	
341	12	9	
9	5	11¼	
38	19	4½	3. £50 17s. 11¼d. ÷ 49.
264	4	3	

ii. *Method of Marking.*

As before, in marking the problems for reasoning, one mark was given for every rational 'step' towards the correct result, thus, in problem 1, it is necessary (a) to add expenses and (b) to subtract them from the selling price. Two marks are obtained if these processes are shown, whatever the result may be in numerical accuracy. In the case of problem 2, there are several modes of procedure, but each will be found to involve four logical steps or processes; thus, we may subtract 5 from 8, and 10 from 13, add the two remainders and then subtract from 29. Or we may subtract 8 from 29, add 5 to the remainder, take away 13 from the sum, and then add 10 to the remainder.

In marking for numerical accuracy, one mark as before was allowed for every correct process in addition, subtraction, multiplication or division.

### iii. Results.

*Table IX., showing general correlation in the preliminary exercises between*

- (a) *reasoning as applied to arithmetical problems,*  
(b) *numerical accuracy in the working of 'rule' sums.*

Marks for Reasoning in 3 Preliminary Exercises.	No. of Children.	Av. Mark Per Child for Reasoning.	Av. Mark Per Child for Numerical Computation.*
19	9	19.0	17.2
18, 17	8	17.2	17.7
16, 15	8	15.6	15.5
14, 13, 12, 11	6	12.5	15.8
7, 6, 5, 4	7	5.4	9.1

\*The marks for each child in numerical computation were, in this school, tabulated to the nearest ten.

It is fairly obvious that positive correlation exists, but it is also obvious that no very definite value can be obtained from the grouped averages. An application of the Pearson formula to the individual cases shows the positive correlation to amount to  $+.69$ .

*Table X., showing the improvement of numerical accuracy within the practice-medium itself.*

Marks for Reasoning in 3 Preliminary Tests.	No. of Children.	Av. Mark Per Child 1st and 2nd Practice Exercise.	Av. Mark Per Child 5th and 6th Practice Exercise.
19	5	123	163
18, 17, 16	6	122	149
15, 14, 13, 12, 11	5	119	123
6, 5, 4	3	63	87

There can be no doubt that, on the whole, a very considerable improvement (approximately 21%) in numerical accuracy has taken place. Let us now see how far (if at all) this improvement in accuracy is transferred to accuracy in arithmetical reasoning.

*Table XI., showing Groups A and B compared in*  
 (a) *reasoning in preliminary problems,*  
 (b) *reasoning in final problems.*

Marks for 3 Preliminary Tests.	Non-Practised Group A.			Practised Group B.		
	No. of Children.	Av. Mark in 3 Preliminary Tests.	Av. Mark in 3 Final Tests.	No. of Children.	Av. Mark in 3 Preliminary Tests.	Av. Mark in 3 Final Tests.
19	4	6.3	7.5	5	6.3	7.1
18, 17, 16	7	5.6	6.4	6	5.5	7.7
15, 14, 13, 12, 11	4	4.5	4.8	5	4.3	5.2
6, 5, 4	4	1.9	1.2	3	1.6	1.6

Taking the groups as wholes we find that whilst Group A scored an average mark of 14.3 (mean variation 3.9) in the preliminary tests and 15.7 (mean variation 6.0) in the final tests, Group B scored in the corresponding tests 14.5 (mean variation 3.8) and 17.9 (mean variation 6.2).

For our present purposes the most useful comparison lies between the marks in the three final tests for the corresponding sections of the practised and non-practised groups. There certainly appears to be an advantage on the side of the practised group in the 2nd, 3rd, and the lowest sections, but it is somewhat disconcerting to see that the highest section of the practised group is worse than the corresponding section of the non-practised group.

#### VII. FOURTH SERIES OF EXPERIMENTS. SCHOOL "O. K."

A fourth series of tests and exercises was undertaken in a municipal boys' school, situated in a rather poor neighbourhood.

The arithmetical work, both on its computational and problematical sides, was decidedly good. The experiment was carried out with the whole of a Standard III. Class, which had an average age of 10 yrs. 0 months, at the time of the commencement of the tests.

The following is a brief chronology of the course of the experiment:—

On Thursday, April 14th, 1910, from 9.55 a. m. to 10.25 a. m., the whole class worked a test in problematic arithmetic; and

at the same time in the morning a second, third and fourth test on April 19th, April 21st, and April 26th respectively. The class was then divided into two equal groups on the basis of the marks obtained for reasoning in the above tests, and, on May 4th, 5th, 6th, 10th, 11th, 12th, 13th, 18th, 19th, and 24th, practise exercises in rule sums were given to one of the groups for half-an-hour each day, whilst the other group worked exercises in English composition. During this period and until the end of the experiment, no arithmetic, other than the exercises and tests of the experiment itself, was done by either group. The irregularity in the succession of the practice exercises was due to intervals of school holiday. After the ten practice exercises, the two groups were put together again and worked four final tests in problematic arithmetic. The first was done from 9.55 a. m. to 10.25 a. m. on Thursday, May 26th; the second, third and fourth at the same time in the mornings of May 31st, June 2nd, and June 7th, respectively.

i. *Specimen Tests and Exercises.*

(a) *A Test in Problematic Arithmetic.*

1. At an election, one man has 6,913 votes, another 7,948, and a third 5,427. What was the number of votes altogether?
2. I had £5 in my pocket. I gave away 18s. 4½d. to one man, 10s. 6¾d. to another, and 13s. 4d. to another. How much have I left?
3. Tom has £8, and Harry has £6 12s. 6d. I give each of them as much again as he already has. How much more will Tom have than Harry after that?
4. A farmer buys 18 lambs at 12s. each. Six of them stray away and are lost. Those which remain he sells at £1 1s. each. What does he gain?

ii. *Method of Marking.*

The problems were marked as before, without reference to the numerical accuracy of the result, and solely with reference to accuracy of method. It is obvious that Problem 1. is a 'one-step' problem; the only rational process is the

judgment that the numbers must be added. Problem 2. involves two processes, the addition of the sums given away and the subtraction of the total from the original sum. Problem 3. is a 'three-step' sum to children at this mental level. Tom's money must be doubled, Harry's money must be doubled, and one of the sums thus obtained must be subtracted from the other. Problem 4. is a 'four-step' problem. It is necessary to find the cost of the lambs, to subtract the number which stray away from the number bought, to find the amount realized by the sale of the remainder, and to subtract the cost price of the lambs from the selling price.

The practice exercises in rule sums were marked for numerical accuracy in the same way as in previous experiments.

### iii. *Results.*

It will doubtless have been noticed that in this experiment no tests in numerical accuracy were set *pari passu* with those in accuracy of arithmetical reasoning. Any correlations, therefore, which are worked out between these two sets of operations can be found only for that half of the class which took the subsequent practice exercises. I do not consider this is so satisfactory theoretically, since the operations are not made under precisely the same conditions. But a correlation worked out on the basis of *four* separate sets of tests for reasoning and *ten* separate exercises in numerical accuracy cannot fail to have some value.

*Table XII., showing the correlation between*  
 (a) *accuracy in arithmetical reasoning,*  
 (b) *accuracy in numerical computation,*  
*of the Practised Group only.*

Marks for 4 Preliminary Tests in Reasoning.	No. of Boys.	Av. Mark Per Boy in Reasoning.	Av. Mark Per Boy in Numerical Computation.
35 to 40	4	37.8	1916.7
30 to 35	3	34.0	1823.7
25 to 30	5	28.0	1573.0
20 to 25	5	22.6	1309.2
15 to 20	8	17.5	1285.0
10 to 15	4	12.5	1222.0
5 to 10	4	7.8	1057.5



The correlation is obviously a high one, and its exact determination from the individual cases by means of the Pearson formula of correlation gives  $+85$ .

I will now show the improvement in the practice medium itself. The classification, as in the above table, is based upon the marks obtained in the preliminary tests in arithmetical reasoning.

*Table XIII., showing the improvement in numerical accuracy within the practised group.*

Marks for A Preliminary Tests in Reasoning.	No. of Boys.	Marks for 1st and 2nd Practice Exercise.	Marks for 9th and 10th Practice Exercises.	Percentage of Improvement.
35 to 40	4	323	410	27%
30 to 35	3	316	397	26%
25 to 30	5	278	329	18%
20 to 25	5	270	313	16%
15 to 20	8	250	310	24%
10 to 15	4	217	253	17%
5 to 10	4	192	230	19%

It will be seen that the improvement is, in all cases, very considerable; it now remains to be seen how far this improvement in accuracy of numerical computation is transferred, if at all, to accuracy in arithmetical reasoning.

*Table XIV., showing the comparison between the practised and unpractised groups in*  
 (a) *four preliminary tests in arithmetical reasoning,*  
 (b) *four final tests in arithmetical reasoning.*

Marks for 4 Preliminary Tests in Reasoning.	Non-Practised Group A.			Practised Group* B.		
	No. of Boys.	Av. Mark for 4 Preliminary Tests.	Av. Mark for 4 Final Tests.	No. of Boys.	Av. Mark for 4 Preliminary Tests.	Av. Mark for 4 Final Tests.
35 to 40	4	37.8	38.3	4	37.8	38.8
30 to 35	3	34.0	38.7	3	34.0	37.0
25 to 30	6	28.0	28.2	5	28.0	32.8
20 to 25	4	22.8	23.8	5	22.6	28.6
15 to 20	8	17.8	19.5	8	17.5	20.3
10 to 15	5	13.2	18.8	4	12.0	13.8
5 to 10	5	8.4	8.6	4	7.8	13.3

\*Two boys, E. W. and C. H., are omitted from the practised group, as one was absent on 8 occasions and the other on 3 occasions during the practice exercises.

Considering the groups as wholes, we find that Group A obtains an average score of 21.8 (mean variation 8.1) and 23.6 (mean variation 9.2) whilst Group B obtains 22.0 (mean variation 8.1) and 25.5 (mean variation 8.5) in the preliminary and final tests respectively.

It is obvious that, on the whole, the practised group does better work in the final tests; in the first of them this group obtains an average mark of 6.2, in the second of 5.7, in the third of 7.6, and in the fourth of 6.0; whilst the corresponding marks for the non-practised group are 5.6, 5.2, 7.1 and 5.7. But the excess improvement of B over A, section by section, is uncertain; indeed, in two cases, the non-practised section does better work than the corresponding section of the practised group.

Every section in both groups shows improvement in arithmetical reasoning, though no arithmetical exercises other than the rule sums, and those by the practised group only, were done during the experiments. This general improvement is probably due to natural growth, and perhaps the influence of the other branches of school instruction; but this latter point is doubtful and needs proof. The general improvement is more obvious in this school because very great care was exercised in order to make the final tests in reasoning of no more intrinsic difficulty than the preliminary ones.

But an improvement which is common to both groups is not an improvement on which we can base the doctrine of the transfer of accuracy. To possess irrefragable support for a doctrine of that kind we should require an excess improvement, section by section, of Group B over Group A. Let us calculate the percentage of improvement from the preliminary to the final tests in each section of each group and see how far such an excess improvement is to be found.

*Table XV., showing the percentage improvement (to the nearest unit) of each group, section by section, in arithmetical reasoning.*

Marks for 4 Preliminary Tests in Reasoning.	Non-Practised Group.		Practised Group.		Percentage Gain or Loss of B Over A.
	No. of Boys.	Percentage Improvement.	No. of Boys.	Percentage Improvement.	
35 to 40	4	1%	4	2%	Gain 1%
30 to 35	3	14%	3	9%	Loss 5%
25 to 30	6	1%	6	17%	Gain 16%
20 to 25	4	4%	4	9%	Gain 5%
15 to 20	8	9%	8	16%	Gain 7%
10 to 15	5	42%	4	15%	Loss 27%
5 to 10	5	2%	4	70%	Gain 68%

### VIII. GENERAL CONCLUSIONS.

My first conclusion is that much more of this work needs to be done; I hesitate to draw hard and fast conclusions, even negative ones, where there is so much irregularity in the results.

My second relates to the inferences which we may draw from high positive correlations between two quantities. It seems to be possible to find highly correlated functions which appear to have very little relationship of pedagogical value. We cannot conclude without further inquiry on other lines, that two highly correlated mental powers are causally related. If they have a common factor or a common cause, it may be one which our methods cannot influence, and its determination has then little value for practical direction, except in a negative sense. Two quantities may be highly correlated but the ratios of their growth may not be; nor may we be able to produce increase in the one by producing increase in the other. I understand that these empirical conclusions are quite in accord with correlational theory, but it is well to state them here, as it is quite possible that educationists will regard an established high correlation as justifying several inferences which do not properly flow from it.

My third conclusion is more especially pedagogical. Teachers wish to know whether they can by improving the

accuracy of function 'A' thereby influence for good the accuracy of function 'B.' I think that in some cases they can. I believe, for example, that various mnemonic functions are so connected in children and young people that improvement 'transfers.' We then need to know how much, for we should not be wise to set out to improve any function indirectly unless an indirect method were quantitatively a better method than the direct one; unless of course, the direct method were not available.

But as to accuracy of arithmetical reasoning and accuracy of numerical computation, what can we say?

It seems possible to improve the accuracy of numerical computation *without any certainty* that we shall thereby improve the accuracy of arithmetical reasoning.

For the present, therefore, pending more conclusive experiments, numerical accuracy should be sought for because it is valuable in actual life, and not because we can feel confident that an improvement in it will transfer to accuracy of arithmetical reasoning.

But if improvement in accuracy of numerical computation is not transferred, how shall we account for the general trend of the final results in reasoning (in all schools except 'S') in favour of the practised groups?

There seem to me two possibilities. I have judged the children's reasoning powers in arithmetic by means of problems numerically worked out, though the accuracy or inaccuracy of the numerical solution has not affected the mark for reasoning. Might not the greater facility in numerical computation, such as was obtained by most of the practised groups, set free, as it were, more mental energy to deal with the rational solution of the problems?

Also, since, in school, the functions of numerical computation and of arithmetical reasoning are often exercised together, the continuance of numerical computation by one of the groups and its discontinuance by the other might well maintain in one case a greater readiness for the associated

operations than in the other, and the former would on that account do better work in arithmetical reasoning than the latter.

But if either of these hypotheses were true, ought we not to expect more regular results; though not perhaps such regular results as if there were a direct transfer of accuracy?

It seems fitting to conclude this research with a question.

The value of the foregoing investigations appears to me to lie chiefly in the suggestion of a method by which a very important pedagogical question may be ultimately solved under school conditions. It is a method which teachers can easily use for themselves, and publish the results for the guidance of their colleagues. I am strongly convinced that, without such active co-operation on the part of the teacher, experimental pedagogy will remain an academic study, with little effect upon the practice of the schools.

## EXPERIMENTAL PEDAGOGY AND EXPERIMENTAL PSYCHOLOGY.

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Within the last few years a number of psychologists have busied themselves with special sorts of psychology—the psychology of memorizing, the psychology of testimony, the psychology of advertising, the psychology of religion—investigating the specific ways in which psychological principles are operative in these various fields. Such studies are not, strictly speaking, applied psychologies (as Münsterberg has recently pointed out) though they are the natural first steps in the direction of application. One must study the peculiar forms under which psychological principles are found operative in any given field before he can hope to use them successfully there. In a few instances, however, genuine applied psychologies have been begun, that is, studies of psychological principles with a view to their use in the control of practical processes and the bringing about of practical ends.

To the minds of some this tendency seems premature, liable to result in misdirected effort and unsound conclusions. In this fear the present writer does not share. The beginnings of applied psychology seem to him full of promise, both for the pure science and for practical ends, and not more liable to miscarry than other sorts of human endeavor. It means, for the pure science, enrichment through an increased body of workers and new facts; and, not least, so long as the science must be financed by appropriations and endowments, it furnishes an effective defense against ignorant and hostile criticism and a tangible excuse for the investment of institutional capital. No science, of course, can flourish if pursued chiefly for its appli-

cations, but on the other hand no science is hindered by having a plentiful supply of them. To have found such applications—or better, to have produced an auxiliary applied science carried on by its own set of workers, means that sufficient methods have been worked out and a tolerable body of facts accumulated, some part of which, at least, has a meaning for practical human affairs. Such a science shows itself well rooted and vigorous.

Of the various lines of practical psychology—using this term to cover both the studies of special fields and the incipient collateral sciences—two are at present of great promise, *educational psychology*, in its various forms of child study (normal and defective), individual psychology and experimental pedagogy, and *medical psychology* in its studies of border-line cases; and of these two the first seems likely to make the more rapid progress because of its simpler problems, the abundance of its materials and the greater degree in which it can be made experimental. Indeed it is just this fact that modern educational psychology is an observational and in part an experimental science which distinguishes it from the earlier and unfruitful attempts to deduce an educational psychology from the generalizations of the pure science, or to carry over into it principles formulated chiefly to fit other sets of facts than its own.

Practical teaching has in a sense been experimental, or at least empirical, from the beginning. Teachers of insight groped forward by instinct, learned by experience and embodied something of their observations in the traditions of the craft, which have all along proved more valuable than anything to be obtained from the speculative psychology of the time. What is now taking place is merely the substitution of the regular siege of scientific procedure for the clever skirmishing of such pioneers. And in course of time this regular procedure will bring about its usual result, will lead here to an educational psychology of easily recognizable value because it will be one that is vital and indigenous to the field in which it

is to be employed. With systematic observation and experimentation workers will come to deal with more clearly defined ideas, will understand one another better and work in fuller co-operation. Accurately recorded observations and experiments are things accessible to all who are interested; they can be repeated, emended and verified, they furnish starting points in discussion upon which all reasonable men can agree. Pedagogical ideas, in proportion as they have not some such objective footing, are apt to be elusive in themselves and unprofitable in discussion, because neither party in the argument can be sure that he knows just what the other is talking about. With this increased clearness will go likewise an increased familiarity with mental processes as they actually occur and an increased feeling of their reality. Those who have never come to the close quarters with these things which the inductive study of them requires see through a glass darkly and walk rather by faith than by sight. And still more important, the atmosphere of clearness and precision required by orderly scientific procedure cannot but react upon the thought and viewpoint of those engaged in it, to their own great advantage and that of their labors. All this is said without disparagement of those who in less systematic fashion have built up the body of pedagogical knowledge upon which the art of teaching now proceeds; their work has been priceless; what is now proposed is such a completion and rectification of it as system and co-operative effort make possible; and, further, such an undertaking is naturally not expected to be an affair of to-morrow but of the future and a long one. Most hopeful beginnings have already been made, however, and the road to be traveled is clear.

From the introduction of these new and more systematic methods much gain will surely result, but one may safely conjecture that it will consist at first much less in the discovery of new pedagogical principles than in bringing rival pedagogical procedures to a decisive test, the settlement of moot points and the substitution of accuracy and certainty for general con-  
jec-



ture; and in this, experimental pedagogy will be but walking in the steps of the other sciences. There were not a few who guessed that the earth was a sphere before Magellan sailed around it; Democritus was an atomist before Dalton, and Aristotle an evolutionist before Darwin. What is now needed in educational theory is not so much revolution and the preaching of an unknown god as proper evaluation of what is already in some manner known and an intelligent service of the god of natural law.

If one asks as to the relation now existing between the experimental branch of educational psychology, i. e., experimental pedagogy, and the older science of experimental psychology, it may be answered that as yet the former draws from the latter a large part of its arsenal of methods, as psychology drew its at the start from physiology, and physiology from physics. This dependence will be transitory, however, for the problem in the end dictates the method; and so far as the problems of experimental pedagogy are different from those of experimental psychology, the methods of the latter will be superseded or transformed into more efficient instruments for reaching the particular results demanded by pedagogy. Experimental psychology undertakes its researches for the description or analysis of mental phenomena and its methods have been adapted to these purposes. They deal with relatively simple phenomena, often with cases artificially simplified and "remote from life." Experimental pedagogy, on the contrary, is interested in determining the most efficient methods for producing given modifications in complex reactions or general behavior. Its methods consequently may be expected to deal chiefly with psychical matters in the gross, such as economical memorizing, the acquirement of skill, instinctive activities, complex perceptions, processes of inference, of emotion and of resolution. Nothing, fortunately, will prevent any experimental pedagogist from ranging as he will in the psychological field. His main interest, however, will usually not be analytical but rather dynamic, in human nature in

action, in human behavior in a way analogous to that in which the comparative psychologist of the broader type is interested in animal behavior.

In so far as experimental pedagogy may deal with the individual or with the establishment of types of mentality, it will of course make use of the methods which have been worked out by the students of individual psychology—which are again, as Stern has shown, distinctly different from the classical ones of pure psychology, the latter focussing upon simple processes in which individual differences are necessarily small, while the former makes use of complex processes where individual differences are frequent and great. When experimental pedagogy approaches questions of class teaching, it will follow the methods of the mass tests already in existence as far as these are useful, and develop others for itself based perhaps on some means of assigning trustworthy quantitative marks to the regular work of school classes.

A danger of all methods which deal with complex mental functions, unchecked by analysis, and one which haunts mass experimentation especially, is the difficulty of knowing what the numerical or other results really stand for, just what the mental processes were which determined them, and whether the latter have been tolerably alike throughout the entire mass, widely variable from individual to individual, or distributed type-wise in several minor groups. The careful experimenter will of course bear this in mind and will check his mass results at all essential points by parallel experiments under strict conditions upon expert observers from whom he may hope for some indication of the possibilities of variation within his group. For this he will need the methods and often the apparatus of the laboratory of pure psychology, his own or that of some one else. The ideal arrangement would of course be one in which the departments of experimental pedagogy and of experimental psychology work in co-operation, the latter occasionally testing the methods of the former as a central observatory might test the chronometers of a navigator or a

bureau of standards the measuring instruments of a practical physicist.

Other dangers—the liability of premature generalization, the adoption of loose and slipshod methods, the futile accumulation of uninterpretable results, the worship of method *per se*—these and all the other dangers of an immature science are present in a greater or less degree for experimental pedagogy, but are not perhaps more threatening in its case than in that of other nascent sciences. Against these all good workers are on their guard, and no outside exhortations are necessary or pertinent. A more peculiar danger may lurk for some who enter experimental pedagogy after a rigorous training in experimental psychology, to wit, that they will not sufficiently break away from the habits in which they have been trained, and will seek in the new field for problems analogous to those which they have found fruitful in the old and attack them by analogous methods, whereas what is most likely to be fruitful in the new field is freshness of view and the preservation of the spirit rather than the form of the old methods. But even this danger is small and in its nature self-corrective; as the new science differentiates, it will train its own investigators. There seems, therefore, no reason for sentiments other than those of satisfaction and happy anticipation in the “coming out” of this first daughter science of experimental psychology.

## COMMUNICATIONS AND DISCUSSIONS.

### CONFERENCE OF THE CITY SUPERINTENDENTS OF WISCONSIN.

The Annual Conference of the City Superintendents of Wisconsin was held October 7th at Madison. The topic of the meeting was the educational value of science, mathematics, and the languages in the secondary schools. Among those participating in the discussion were President David Felmley, of the Illinois State Normal University; Professors C. R. Mann and C. H. Judd, of the University of Chicago; and Prof. M. S. Slaughter, of the University of Wisconsin. President Felmley maintained that the high-school work in mathematics should take a wider range, include more subjects, and teach only the elements of those subjects. The high school, he maintained, should seek to meet the needs of common occupation rather than to satisfy college-entrance requirements, and the mathematics of the high school should be correlated with other subjects.

Professor Mann maintained that the ideals which have been consciously developed by a study are transferable to other studies and increase the efficiency in subjects other than those studied. The ideals to whose development science is best qualified to contribute are (1) the inviolability of law, (2) freedom as conformity to law, and (3) unity. To make science significant to pupils it is necessary to begin the study where the pupils are; that is, in the details of their daily lives. There is danger in remaining too long in the study of what is purely practical for then the real content of the work,—the factors that contribute toward the building of the ideals,—is meagre.

Professor Slaughter classified the values of the study of foreign languages in the high school as (1) disciplinary, (2) practical, and (3) cultural. The disciplinary value is involved in the training furnished the memory, the reasoning “faculties,” and the “powers of observation and judgment.” The practical value is involved chiefly in the incidental training in English, and in arousing the “language consciousness.” The cultural value lies in the content of foreign literatures. “Studies calling the attention away from the immediate and practical to the remote

and spiritual, to the purely humanistic element, should find a large place in school programs."

Professor Judd urged a more concrete treatment of secondary mathematics and suggested that the distinctions at present drawn between arithmetic, geometry, and algebra be neglected, and that certain phases of algebra be taught in the elementary school. The teacher of science should aim to meet the needs of high-school pupils in the way of useful information, and emphasize scientific method only in so far as this method can be acquired by high-school pupils. The foreign languages are to be defended on the ground that they furnish the pupil with a certain amount of information, especially concerning other peoples and types of civilization. Professor Judd thinks this defense insufficient to justify the retention of foreign languages in the secondary curriculum, but when to this is added the training that foreign-language study may give in the effective use of the mother-tongue, he believes that a strong case for languages can be made out.

W. C. B.

#### ANNOUNCEMENT OF THE JOURNAL OF ANIMAL BEHAVIOR AND THE ANIMAL BEHAVIOR MONOGRAPH SERIES.

In response to a widely felt and urgent need for a periodical in which studies of the behavior and mental life of organisms may satisfactorily be published a journal and a monograph series have been planned.

THE JOURNAL OF ANIMAL BEHAVIOR will accept for publication field studies of the habits, instincts, social relations, etc., of animals, as well as laboratory studies of animal behavior or animal psychology. It is hoped that the organ may serve to bring into more sympathetic and mutually helpful relations the "naturalists" and the "experimentalists" of America, that it may encourage the publication of many carefully made naturalistic observations which at present are not published, and that it may present to a wide circle of nature-loving readers accurate accounts of the lives of animals.

Beginning with January, 1911, the Journal will appear bi-monthly in numbers of approximately 75 pages. Each annual volume of six numbers will consist of not less than 450 pages.

The subscription price will be \$3.00 per volume (foreign, \$3.50). This low price to subscribers can be maintained only if those who are interested in the study of the behavior and psychology of animals promptly subscribe and work for the support of the Journal.

The Journal is under the editorial direction and management of:

I. Madison Bentley, Assistant Professor of Psychology, Cornell University.

Harvey A. Carr, Assistant Professor of Psychology, The University of Chicago.

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Herbert S. Jennings, Henry Walters, Professors of Zoölogy, The Johns Hopkins University.

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Margaret F. Washburn, Professor of Psychology, Vassar College.

John B. Watson, Professor of Experimental and Comparative Psychology, The Johns Hopkins University.

William M. Wheeler, Professor of Economic Entomology, Harvard University.

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The Journal is not the property of any individual, and it is to be conducted solely in the interests of those branches of science which it represents. All income from subscriptions and other sources, above that necessary for the support of the publication as it is planned, is to be devoted to its improvement and enlargement.

Reviews of especially important contributions within its field will be published as they are prepared, and, in addition, a number especially devoted to reviews, digests, and a bibliography of the contributions to animal behavior and animal psychology for the year will be published annually. This review number is to be in charge of an Editor of Reviews. It is hoped that this special number may prove of value to those readers whose library facilities are meagre.

THE ANIMAL BEHAVIOR MONOGRAPH SERIES will be published in connection with the Journal as a provision for papers which are too lengthy, or, for other reasons, too costly to be accepted by the Journal.

The monographs of this Series will appear at irregular intervals, and they will be grouped in volumes of approximately 450 pages. The separate monographs will be sold at prices determined by the cost of manufacture, and the volume will be sent to regular subscribers for the price of \$3.00 (foreign, \$3.50). Subscribers to the Journal are urged to subscribe to the Monograph Series.

The *Journal of Animal Behavior* and The *Animal Behavior Monograph Series* will be published for the Editorial Board by Henry Holt and Company, New York.

Manuscripts for the *Journal* may be sent to the managing editor, Professor Robert M. Yerkes, Emerson Hall, Cambridge, Massachusetts, or to any other member of the Editorial Board.

Manuscripts for the *Monograph Series* should be sent to the editor, Professor John B. Watson, The Johns Hopkins University, Baltimore, Maryland, from whom information may be obtained concerning terms of publication.

Books and other matter for review in the *Journal* should be sent to the editor of reviews, Professor Margaret F. Washburn, Vassar College, Poughkeepsie, New York.

All business communications should be addressed to The *Journal of Animal Behavior*, Cambridge, Massachusetts.

## ABSTRACTS AND REVIEWS.

### SOME RECENT LITERATURE UPON FATIGUE.

FREDERICK S. LEE. *The Nature of Fatigue.* Popular Science Monthly, 76; February, 1910, 182-195.

MAX OFFNER. *Die geistige Ermüdung.* Berlin: Reuther und Reichard, 1910. Pp. 88. M. 1.80.

CLARENCE STONE YOAKUM, PH. D. *An Experimental Study of Fatigue.* (Psychological Monographs. Whole No. 46.) Baltimore: The Review Publishing Company, August, 1909. Pp. 131.

W. MACDOUGALL. *The Conditions of Fatigue in the Nervous System.* Brain, November, 1909, 256-268.

Dr. Lee's article is an address delivered before the Section on Hygiene of the Connecticut State Teachers' Association, and consists in a non-technical presentation of the physiology of fatigue, with briefer consideration of mental fatigue.

Typical tracings of curves from nerve-muscle preparations are introduced to illustrate, in the curve of work, the preliminary stage of improvement, *Treppe*, the stage of maximal efficiency, and the subsequent decline due to fatigue.

The chemical conditions of fatigue are shown to lie in the consumption of oxygen and carbohydrate and in the production of the so-called 'fatigue-substances,' particularly of carbon dioxide and lactic acid. Lee has found by experiment that these substances, when present in small quantity, increase protoplasmic activity and augment muscular energy. He, therefore, contends that the *Treppe* may be attributed to the primary stimulating effects of small amounts of the fatigue-substances.

We know that the nerve fibre is resistant to fatigue. The work of Hodge and others has, however, led to general acceptance of the idea that the cell-body was distinctly susceptible to fatigue. Nevertheless, says Lee, we have no indisputable evidence of genuine fatigue of the nervous system. "The preponderance of evidence at present seems to me to be in favor of a high degree of resistance to fatigue on the part of the brain and spinal cord, as of the nerve fiber itself." Moreover, on



*a priori* grounds, the administrative function of the nervous system, he argues, is so highly important that it must be equally important to the organism that its nervous system should be able to resist the oncoming of fatigue.

In mental work, Lee finds again the same three stages characteristic of the work of the isolated muscle, and he does not doubt that they are associated with the same chemical phenomena. If this means that the presence of small quantities of fatigue-substances suffice to account for one's mental 'second wind,' the explanation is obviously too simple, as a perusal of Offner's analysis of the psychical factors in the curve of performance will show.

Other points of interest in Lee's exposition are these:

"Excessive work of one tissue may cause the fatigue of other tissues."

A temporary change of occupation may be of great benefit by relieving an exhausted organ or focus of attention.

We must learn to distinguish, in ourselves and in others, between real and pseudo-fatigue. We should not permit the child to yield to every sign of weariness; neither should we neglect the warning symptoms of real fatigue or carry fatigue to exhaustion with consequent slow or permanent incomplete recovery. Habits of industry are the converse of habits of fatigue, and they imply, in the last analysis, "an acquired power of resistance to fatigue-substances." On the whole, thinks Lee, "few of us live up to our opportunities for accomplishing things." "Most of us work too briefly and rest too long." All this may be true, though there will be many who will not accept the indictment. But how can Dr. Lee derive from the physiology of fatigue the conclusion that "even without hereditary endowment, more of us might have, if we would, the endurance of a Weston, the discernment of a Darwin, the shrewdness of a Harriman, the determination of a Peary, or the insatiable desire to be on top, which distinguished our late President" (italics ours)? If discernment, shrewdness and determination are not bred in the bone, and can be had for the effort, surely the psychology of mental inheritance has something to unlearn.

Offner's monograph, likewise, represents a lecture, here somewhat amplified, delivered before a society of teachers. It is, however, a more ambitious, and to psychologists a more satisfactory, analysis of the problem of fatigue, at least of mental fatigue. Indeed, this booklet impresses us as just the kind of thorough, scientific résumé that is now

most needed in the field of applied psychology. A full translation will appear later. At present we may but sketch its contents.

After a brief introductory account of the nature and symptoms of fatigue, the author devotes 30 pages to the measurement of fatigue, and 40 pages to the results of these measurements, and concludes with a discussion of certain practical problems. A bibliography of five pages and an index are appended.

The following points may serve as illustrations of Offner's treatment of his subject:

Subjective symptoms afford an unreliable measure of fatigue. For objective measurement we may turn either to physiological or to psychological processes. Tests of physical strength (dynamometer) and endurance (ergograph), and of rate of movement (tapping), as well as measurements of pulse, respiration, and ocular accommodation have given us, it is true, many valuable suggestions, but they have not as yet given us a reliable method for measuring fatigue.

The psychological methods include esthesiometry, the estimation of time intervals, the determination of sensitivity to pain and other limina, such tests as dictation, computation, memory-span, cancellation, copying, and Ebbinghaus' completion method, together with the various forms of the 'continuous-work method,' which has been especially favored and developed by Kraepelin and his followers. It cannot be denied, says Offner, that, taken as a whole, the psychological methods can afford useful average values and reliable information concerning the course and effect of fatigue, and can, accordingly, assist us directly in the regulation of our work (p. 35)—a conclusion to be contrasted with Lee's declaration (p. 188) that all attempts at exact measurements of the mental effects of fatigue "and the deduction therefrom of the degree of psychical or physical fatigue have failed."

Among the results of the study of fatigue by the psychological method is the analysis of the several factors, other than fatigue, that condition efficiency (*Leistungsfähigkeit*). While Lee, as we have seen, apparently finds a sufficient theoretical explanation of the work-curve in the chemistry of the fatigue-substances, the psychologist unearths, in addition to fatigue proper, practice, both concomitant and persistent (*gleichlaufende* and *nachdauernde*), adaptation, preparedness, warming up (*Anlauf*, *Anregung*), spurts (*Antriebe*) of several types—initial, terminal, etc.—together with voluntary effort, ennui, diurnal rhythms, and, perhaps, still other factors.

The discussion of the "laws of fatigue" shows how much has really been established with regard to the dependence of fatigue upon age, sex, length and number of lessons, time of day, day in the week, time and length of recesses, holidays, and vacations, amount of rest, sleep, and other recuperative agencies, nature of the work, arrangement of the school program, personality of the teacher, etc.

Offner, like Lee, preaches the Gospel of Work. We need not worry because children show signs of weariness: nay, it is well to teach them to stand up under the pressure of fatigue. Only, teach them also how to economize their energy and to refresh and maintain their physical and mental efficiency by the rational utilization of the great recuperative agencies, nutrition, play and sleep.

Yoakum's thesis from the laboratory of the University of Chicago devotes 42 pages to an historical statement of the fatigue problem, with special reference to mental fatigue. This statement takes up in particular the question of muscle fatigue, its nature and locus, the possibility of detecting and measuring mental fatigue by modifications in reaction time and in sensory capacity, and the analysis of the 'work curve' as carried out especially by Kraepelin and his followers in the Heidelberg laboratory.

Yoakum makes a special point of the failure thus far of the objective records to cope with the details of the situation engendered by the onset of fatigue, and also calls attention to the fact that investigators of fatigue have insisted upon maximal speed of work by the subjects of their tests, in disregard of the fact that each individual has his own normal rhythm of work which may be entirely obscured by this demand for maximal efforts, so that what is tested is really an abnormal psychophysical condition that "does not present to us a clear picture of the properly working organism."

Yoakum's own study was carried on by an amplification of the 'pattern-tapping' method that was given preliminary trial in the Chicago laboratory by Mrs. Squire. A series of ten digits was memorized and then tapped, by movements of the lip or of the finger, either directly as memorized or with such modifications as might be assigned by the experimenter. The idea was to secure an objective record of a continuous bit of mental work by a process that obviated almost entirely fatigue of the muscles involved. In the main, the tapping was done "at will," though, in control tests, maximal speed was demanded. This process was continued, unfortunately it seems to us, for but 15-20 min. only, and an

attempt was made, both by scrutiny of the record and by appeal to introspection, to unravel the several factors affecting the efficiency of the work from minute to minute, *e. g.*, such factors as acquisition and retention of practice, spurts of various sorts, weariness, warming-up, exhaustion, general physiological condition, etc. Particular stress is laid upon the fact that, when errors appeared at all in the record, they tended to appear in groups. A number of characteristic groups are described, *e. g.*, an initial or 'practice' group, a second group at the 9th to the 11th minute, a third group a little later, which is always the largest group of the series, etc. "As far as can be determined, \* \* \* the number of errors and the distance between the groups, their size and length, their place in the series, all depend on the actual physiological condition of the subject as he begins the experiment" (p. 84). Errors are further classed in type as 'mechanical' or as 'psychic,' and these types are found to alternate in the several groups just mentioned.

The monograph concludes with an elaborate, technical discussion of the ultimate nature of fatigue, which we can not attempt to summarize here save in the most elementary way. The feeling of weariness, or so-called 'sensation of fatigue,' arises suddenly and is of peripheral origin. Looked upon functionally, fatigue is only a manifestation of a general psychophysical tendency to shift a coördination that has been in use until its operation becomes retarded—its 'path' blocked, *e. g.*, as illustrated on a relatively simple scale in the 'negative induction' theory by which Sherrington explains so-called muscle fatigue. As we understand Yoakum's hypothesis, the simple fact that conscious processes are transitory and fleeting is one expression of this shifting of neural functioning due to fatigue. In a mature, trained individual, there exists an elaborately organized hierarchy of coördinated systems—habits of thinking and acting—such that a guiding purpose or incentive can, as it were, be carried out persistently by more or less automatically functioning shifts of the neuromuscular activities that are subordinated to the purpose or incentive in question—one set of responses tires, another is set in train, then a third, then perhaps the first, again, and so on. Sensations of fatigue arise, not within the coördinated group of shifting strains, but in muscles located at any place in the body that are under tension in guiding the activity of the group just mentioned. We may, for instance, feel tired in the back of the neck from intellectual activity in solving problems in mathematics. Exhaustion constitutes a special case; it is a complete stoppage of ac-

tivity, coupled with distinct loss of the preceding conscious process, which results from a "practically complete localization of all available energy on the continuance of a single function" (p. 68). Finally, there appears fatigue proper, "where the functional activity of the organism has diminished because of the attainment of a limit in the expenditure of stored-up energy" (p. 123).

According to MacDougall, fatigue manifests itself by three sorts of subjective symptoms—by certain sensations localized in the muscles, by a feeling of incapacity to exert effort, and, finally, by a desire for sleep. These symptoms do not ordinarily betoken actual incapacity to continue work, but constitute warning or protective signals.

Verworn's theory of fatigue (the accumulation of waste products and the consumption of reserve energy) is too simple, according to MacDougall, who here, as in his *Physiological Psychology*, prefers to envisage neuro-muscular activity in terms of the reflex-arc concept and to follow Sherrington and others in utilizing the notion of the 'resistance' or 'blocking' of nerve paths at the synapses. These resistances limit the activity of the organism and prevent it from reaching the condition of exhaustion. Fatigue is, therefore, a matter of the relative balance between available energy and the resistance against which this energy must work.

The fact that the organism can struggle against fatigue is explained by the assumption of special reserves of energy. Thus, for instance, the awakening of interest in a problem means that one of these reserves is brought into play. A vigorous stimulus or a powerful incentive makes it possible for one to accomplish, without feeling fatigue, tasks that otherwise would be quite beyond one.

Individual differences may be distinguished in the balance of the two factors above mentioned. Thus, a person whose resistances are relatively feeble is necessarily excitable, slow to lose the glow of work, and finds it difficult, after intellectual activity, to compose himself for sleep; his mental mechanism functions until the active centers are worn out. In extreme, this gives us the neurasthenic constitution. Darwin and Spencer are cited as examples of individuals who can work very effectively for a short space of time, but who tire quickly and demand rest before resuming the work.

Again, if the 'resistances' are normal, but the energy chronically deficient, the hysteric type results, and the insufficiency reveals itself when some heavy demand is made upon energy.

These views of the ultimate nature of fatigue, and the similar ones that we have noted in Yoakum, who likewise takes Sherrington for his starting-point, ought not, in our opinion, to mislead the reader; it should be understood that they are, and seem likely to remain, a matter of conjecture and speculative opinion. There is no final system of physiological psychology. Perhaps a half-dozen equally workable schemes could be made out. Just now, such concepts as the reflex arc, synaptic blocking and resistance, negative induction, etc., happen to be to the fore. The applications of these neurological notions to fatigue are not demonstrated facts, though they are, it must be admitted, very ingenious and suggestive, and they may very well lead to experimental investigation that shall unearth some additional facts of value.

G. M. W.

### STUDIES IN ARITHMETIC.

DAVID EUGENE SMITH, LL. D. *The Teaching of Arithmetic*. New York: Teachers College, Columbia University, 1909. Pp. 120. Paper \$1.15. Cloth \$1.50.

CLIFF WINFIELD STONE, Ph. D. *Arithmetical Abilities and Some Factors Determining Them*. New York: Teachers College, Columbia University, 1908. Pp. 101. Paper \$1.15. Cloth \$1.50.

S. A. COURTIS. *Manual of Instruction for Giving and Scoring the Courtis Standard Tests in Arithmetic*. Detroit, Mich.: S. A. Courtis, 441 John R. Street, 1910. Pp. 40.

Since arithmetic is not only one of the most important subjects in the schools but also brings into play some of the highest and most abstract thought activities, a study of the mental processes involved in it is of decided interest to the psychologist as well as to the educationist. It is a matter for congratulation, therefore, that American experimentalists are beginning to investigate the problems in this field.

The first of the studies mentioned above is a general survey of arithmetical teaching. The author emphasizes the value of a knowledge of the history of mathematics for keeping teachers level-headed, and preventing the epidemics of method to which American educators have been particularly susceptible in the past. The aim of arithmetical teaching is a mixture of the practical and cultural ideals which the Greeks kept so religiously separate, and its chief cultural values are training in accuracy of dealing with abstract quantities and the development of

a clear form of analysis. Life is made up of problems, and in arithmetic the child is confronted with situations where the issue must be squarely met, all relevant past experience brought to bear upon it, and the solution definitely pronounced right or wrong. It is the duty of teachers to select problems which will be informational and adapted to the pupil's environment.

The arrangement of material depends wholly upon a psychological study of child development, and on this subject we have as yet all too little accurate information. The methods in current use are based chiefly on tradition or opinion, and, while these have their own justification, we need detailed, scientific studies of the results of various methods under experimentally controlled conditions. The normal and training schools of the country should be veritable laboratories for such investigations, but unfortunately the authorities are not always in sympathy with this kind of work.

The most interesting and important portions of the book for experimental pedagogy are chapters 13 and 14, in which, with the assistance of Professor Suzzallo, the author suggests over thirty subjects for experimental investigation. Typical problems are: (1) How long at a time may drill in oral arithmetic be profitably continued? (2) To what extent can recreations in number be advantageously used in teaching arithmetic? (3) How do children's interests develop from year to year, and what does this imply for arithmetic teaching? (4) What is the result of emphasizing the abstract problem, and what the concrete? (5) What is the most profitable amount and distribution of time to be devoted to arithmetic, and how should this be divided between oral and written work? (6) To what extent should we drill on fundamental operations, and how soon are we justified in passing to applications? (7) In addition, should the teaching of any combination (as  $3+4=7$ ) be immediately followed by its reverse ( $4+3=7$ ), or may these combinations be as economically left unrelated? (8) What is the relative difficulty of the various combinations? (9) Is there any advantage in the so-called "Austrian" method of subtracting by addition over the method of subtracting through specially learned subtraction combinations? (10) Since partial products represent but stages in calculation, do they need to be understood as to their placing, or should their placing be taught as a mechanical process through habit formation? (11) Is there any need for division tables of combinations?

Chapters 15-22 contain a brief but valuable survey of the arithmetic

work for the eight grades. The book is simple, direct and popular in style, and for its sanity, its freedom from bias and dogmatism, its recognition of the problems still to be scientifically attacked, and its explicit and detailed discussion of many of these problems, it deserves the highest commendation.

Dr. Stone describes an extended experimental investigation of the arithmetical abilities of children in the 6A grade. He drew his materials from 26 school systems, ranging from Massachusetts to Illinois, and he personally conducted the tests in each of the 152 classrooms, securing over 6,000 test papers. In addition, he collected data as to the time spent on arithmetic by these pupils both in and out of school, in each of the grades from one to six. Finally, he obtained the course of study from each of the 26 systems, and had these arranged by competent judges in order of excellence. Two test papers were used with each pupil, one for the fundamental arithmetical operations, the other for arithmetical reasoning. The paper in fundamentals contains 14 test problems, those from 1 to 9 were arranged in order of increasing difficulty, the time allowed was 12 minutes, and the results were scored on the basis of 1 for each step of each problem. The paper in reasoning presented 12 problems of increasing difficulty, the time allowed was 15 minutes, and, on the basis of preliminary experiments, the results were scored from 1 to 2 for each problem. In the comparison of systems the scores of 100 pupils from each system were taken at random and combined. The following are some of the more important results:

1. The scores for the 26 systems vary in fundamentals from 1841 to 4099, and in reasoning from 356 to 914. The same system often occupies a decidedly different rank in fundamentals from that held in reasoning.

2. Comparing the scores of all systems, the correlation of reasoning with the average of the fundamentals is quite low (.40),—it is lowest with addition (.32), and highest with subtraction (.50). The correlation of the different fundamentals with each other is very high (.90 to .95).

3. An examination of the individual scores of 500 pupils chosen at random from 4 systems shows a wide variability, ranging from 3 to 63 in fundamentals, and from 0 to 15.2 in reasoning. With a median of 6 in the latter, 33 pupils score only 2 or less. The boys are no more variable than the girls.

4. In the individual scores reasoning shows a still lower correlation with fundamentals (.32) than in the systems, and the correlation is



lowest with addition (.28) and highest with division (.36). Addition shows a much lower correlation with the other fundamentals (.50 to .65) than these do with each other (.89 to .95). In view of the difference in correlations between the scores for individuals and those for systems one cannot help wondering just how trustworthy these figures are. Would the author have obtained the same correlations if he had taken another 500 individuals at random from the same four systems? Or is the difference due solely to the systems chosen?

5. In general it would seem that division is most like reasoning, subtraction comes next, multiplication is a close third, and addition is farthest removed. Moreover, ability in addition is the least guarantee of ability in other fundamentals.

6. It is inadmissible to speak of arithmetical ability as a single function,—rather we have to do with a number of abilities or products, and there is less connection between arithmetical reasoning and ability in the fundamental operations than between English and geography.

7. Supervision by the superintendent or a special supervisor does not seem to be a potent factor in developing arithmetical abilities.

8. The total time devoted to arithmetic in the first six grades varies in the different systems from 7% to 22% of the total school time, yet an elaborate comparison of time expenditure with accomplishment indicates that difference in time plays an almost negligible role. More important factors are the distribution of time among the grades and the use of time within a grade. In many systems there is a deplorable waste of time.

9. The correlation of excellence of the course of study, as rated by the judges, with arithmetical reasoning (.56) is much higher than with fundamentals (.13). Future improvement in the course of study lies in the direction of indicating the place of drill in the educative process.

The monograph opens a splendid field for research and should stimulate others to undertake similar investigations.

Inspired by Stone's monograph Mr. Courtis has worked out a system of graded "standard" tests with full directions for use, so that data of this sort may be collected in a uniform manner from all parts of the country. The tests are quite different from those used by Stone, are simple enough to be used in every grade from the lowest to the highest under identical conditions, and they may be employed for comparative studies such as Stone's, for investigating the effect of specific methods, or for testing the growth of pupils in arithmetical abilities from time

to time and showing the teacher what individual defects need attention. The test sheets are sent out in packages and are furnished at cost, provided the recipient agrees to fill out and send to headquarters the record sheets which accompany the tests.

As we have seen, Stone concludes that there are a number of arithmetical abilities. Courtis distinguishes 14. Nos. 1, 2, 3 and 4 involve control of fundamental combinations in each of the four operations; 5, 6, 7 and 8 imply knowledge of the symbols, processes and forms of each of the four operations; 9 depends on the rate of motor activity; 10 is ability to "borrow and carry;" 11 is ability to pay attention to mechanical details; 12 is ability to recognize a situation as calling for the use of a certain operation (reasoning); 13 and 14 are abilities to use all the above in the complex situations of abstract examples, or two-step problems. The eight tests here presented are designed to furnish materials for a quantitative estimate of all these abilities. The undertaking is an interesting venture in co-operative experimental pedagogy and we hope it will receive hearty support.

J. C. B.

## NOTES AND NEWS.

The German Association for School Reform, which we have previously noticed in these columns, has organized the following committees: 1. Committee on mathematics and natural science teaching. 2. Committee on the training of teachers. 3. Committee on experimental schools. 4. Committee on paidology. The latter committee, under the chairmanship of Professor W. Stern, is preparing a Handbook of Paidology, is to issue a memorial by Professors Stern and Meumann on the establishment of paidological institutes, and is making arrangements for a paidological congress.

On the eighth of October Dr. Bertil Hammer was inaugurated Professor of Pedagogy in Upsala University with imposing ceremonies. The invitation address by the Rector of the University is an exceedingly interesting historical résumé of the evolution of the idea of teaching pedagogy in Sweden, going back several hundred years. It is interesting to find that the step now consummated in the establishment of this chair was attempted one hundred years ago. Rector Schueck's address is an historical document full of details showing very clearly the evolution of Pedagogy, as for example by the full citation of faculty debates, theories and legislation on the subject.

The Illinois Schoolmasters' Club held its first meeting of the year at Normal on the evening of October 28th. The topic of the evening session was educational values. Professor W. C. Bagley, of the University of Illinois, urged the importance of distinguishing sharply between educational values and educational functions. The problem of evaluation is a normative problem; the problem of function is a positive problem; the one is to be solved by reference to the ultimate aim of education (an ethical question), the other by psychological investigation (a psychological question). Functions of subject-matter are to be determined by the type of conduct-control that the study of a subject leaves with the pupil. Four types of controls were discussed: (1) habits, (2) ideas (including formulations of the relations between ideas), (3) ideals, and (4) prejudices. Most questions hitherto discussed under the head of educational values are really questions of educational func-

tion. The problem is not whether the outcome of the study is valuable, but whether the contemplated outcome is possible.

Professor G. F. Arps of the University of Illinois took issue with Professor Bagley in the distinction drawn between ideas and ideals. This objection was sustained by Professor Judd of the University of Chicago, and by Professor Colvin, of the University of Illinois. Professor Judd maintained that the discussion of values and functions would not help materially in solving the problems of the classroom teacher. The teacher would best forget all about such matters and devote his energies to imparting to his pupils the information that he is supposed to teach. Professor M. J. Holmes and President Felmley, of the Illinois Normal University, supported the contention that a distinction between ideas and ideals is justified.

In the "School of Higher Studies" of the National University of Mexico, recently founded, authoritative professors are being engaged to give courses lasting each three months. Such an appointee has the title of Professor, and is to reside at Mexico City each year for three months during his term of office. Among those already appointed on these terms are Professors Richet (Paris, Physiology), Capitan (Paris, Ethnology), Boas (New York, Anthropology), Rowe (Philadelphia, Political Science), Baldwin (Baltimore, Philosophy and Social Science), and Reiche (Germany, Botany). Professor Baldwin opened the series with a course entitled "The Individual and Society," which is to continue until January, 1911, and is to be followed by a "seminary" course in 1911-12. Professor Boas begins in November, 1910, Professor Richet in January, 1911, etc. The qualifications for enrollment are graduation from a university school (college), and high honors in subjects related to that which is to be pursued. The first course given under these restrictions had an enrollment of thirty-five. It is expected that the professors will devote these courses to research as well as to instruction.

In a recent address before the German Association for School Reform, Professor W. Stern made a strong plea for class grading in schools according to the psychological differences of the pupils. It is easy enough to talk of teaching individuals rather than classes but when a teacher has a fifth grade class containing 50 pupils ranging from second to eighth grade abilities (as is frequently the case) individual instruction is out of the question. By the application of psy-

chological tests in place of the present hap-hazard methods a much more satisfactory grouping of pupils could be attained.

An estimate of the progress of elementary education in Ireland has been formed from the signatures made by the contracting parties in the marriage registers or certificates. In 1909 93.5 per cent. of the husbands and 95.0 per cent. of the wives wrote their names, the remainder signing by marks, as against 86.8 and 88.6 per cent. in 1899, 78.8 and 78.0 per cent. in 1889, and 72.0 and 67.1 per cent. in 1879. The improvement of the women over the men is significant of the modern trend.

The system of advisors to freshmen at Harvard University has been greatly extended. Many more advisors have been appointed from the instructing staff, so that, whereas formerly an instructor might have as many as 15 freshmen in his charge, at present there is one advisor for every three or four of the incoming class. Furthermore, another corps of advisors has been enrolled from the senior class, so that each member of the class of 1914 is officially assigned an instructor and a senior to whom he may go for advice.

A call has been issued by George V. Briggs, superintendent of the Philippine Normal School, for 100 new teachers to fill vacancies for the school year beginning June, 1911. Ten of these teachers will be needed for high-school science, ten for industrial subjects, twenty for other high and intermediate school subjects, five to teach domestic science, and others for supervising positions.

The various teachers' associations of Illinois have united in a petition to the General Assembly urging the appropriation of \$250,000 for erecting and equipping a building for the School of Education of the University of Illinois.

Teachers College, Columbia University, is offering a number of research fellowships and scholarships for investigations in comparative education. The work is under the direction of Professor Farrington, who will spend the second half-year in Europe, superintending these investigations.

Again the poor high school is berated by the university. Tests in geology at the University of Wisconsin show that freshmen often cannot locate important cities, rivers or mountains in their own or foreign

countries. Many could not tell in what state were such well-known cities as Richmond, Mobile, Memphis, Butte, Syracuse, Nashville, Spokane, Atlanta and Scranton. Some could locate only four of the following ten cities: Vienna, Venice, Lisbon, Bombay, Buenos Ayres, Hongkong, Athens, Moscow, Shanghai and Melbourne. One-third to one-half failed on such important rivers as Rhine, Volga, Ganges, Orinoco and Euphrates, such mountains as Pyrenees, Caucasus, Himalaya, Sierra Nevada and Mt. McKinley. The *New York Evening Post* says, "The examination confirms the feeling, long entertained by colleges, that locational geography should receive more attention in secondary schools. As most high school students do not get beyond elementary geography, the university authorities say that a knowledge of the location of the most important physical features and cities of the globe should be taught. The high school student, whether he goes to college or enters business, should possess some knowledge of important centers of the world's commerce or those which are frequently talked about among educated people, of the principal mountains, rivers, seas, gulfs, etc., of the globe, and of the main political divisions of the continents."

The New York High School Teachers' Association is carrying on a vigorous campaign for a revision of the college entrance requirements, and an emancipation of the high school from college domination. Principal W. D. Lewis, of Philadelphia, a recent speaker before the Association, said "There has been a gradual evolution in the course of study of the elementary school. Changes following the great movement for child study were denounced by the "stand-patters" as fads and frills. The changes, however, have continued. In the high school the revision, of course, has been less marked, because the demands of the colleges have so largely determined the high school course. It has at last become necessary that the high school course be revised, for the same reason that the tyranny of political bosses shall be abolished."

Among the public introductory lectures given at University College (University of London) during October were "Recent Investigations into the Mental Growth of Children," Dr. C. Spearman, and "Instinct," Professor Carveth Read.

At the meeting of the Central Ohio Teachers' Association, held at Dayton, Ohio, November 11 and 12, Professor Charles H. Judd, Director

of the School of Education of the University of Chicago, delivered an address on "The Scientific Study of Education."

The American Psychological Association will meet in conjunction with the North Central Association of Teachers of Psychology, and the American Association for the Advancement of Science in Minneapolis on Wednesday, Thursday and Friday, December 28, 29 and 30.

Professor James R. Angell, of the University of Chicago, will give three lectures at Union College in January and February. They will be known as the Ichabod Spencer lectureship series, and are supported by the endowment of \$75,000 for the department of philosophy which was recently made by Mrs. Catherine Leavitt, of Washington, in memory of her father, Ichabod Spencer.—*Science*.

Dr. George Kerschensteiner, superintendent of schools of Munich, delivered an address at the meeting of the Society for the Promotion of Industrial Education at Boston in November.

Mrs. Helen Thompson Woolley, formerly head of the department of psychology at Mt. Holyoke College, is assisting in the department of philosophy in the University of Cincinnati.

Mr. F. A. Thomas has been appointed principal of the Academy of the University of Illinois and Supervisor of Practice Teaching in the School of Education, *vice* Mr. C. M. McConn, who succeeds Mr. W. L. Pillsbury as Registrar of the University.

Alvin C. Kraenzlein, formerly of the University of Pennsylvania, has been appointed assistant professor of physical training at the University of Michigan.

Dr. Kendrie Charles Babcock, president of the University of Arizona, has been appointed specialist in higher education in the United States Bureau of Education, to fill the new position created by the present congress at its recent session.—*Science*.

Dr. W. B. Pillsbury, junior professor of psychology in the University of Michigan, has been advanced to a full professorship of psychology in that institution.

Miss Ethel Bowman, B. A., has been appointed assistant in psychology in Wellesley College.

## PUBLICATIONS RECEIVED TO NOVEMBER 1, 1910.

(Notice in this section does not preclude a more extended review.)

G. ANTON, *Ueber krankhafte moralische Abartung im Kindesalter und über den Heilwert der Affekte.* Juristisch-psychiatrische Grenzfragen, Vol. VII, No. 3, 1910. Pp. 23. M. 1.

A brief summary of moral diseases of children, with bibliography.

L. ESTELLE APPLETON, PH. D. *A Comparative Study of the Play Activity of Adult Savages and Civilized Children. An Investigation of the Scientific Basis of Education.* Chicago: The University of Chicago Press, 1910. Pp. 94. Paper, 54c.

A very interesting study of native and acquired play reactions. Such comparative investigations throw much light on that modification of instinctive behavior which is the aim of education.

HENRY E. ARMSTRONG, LL. D., PH. D., F. R. S. *The Teaching of Scientific Method, and other Papers on Education.* London: Macmillan and Company, 1910. Pp. xxvii, 504. \$1.75 net.

This is a second edition of a well-known work and includes, in addition to the twenty-four essays of the first edition, a new prefatory essay and two new articles, one on the correlation of mathematical teaching with other school work and one offering a general criticism of school method. The author's key-note is his insistence on the value of method and of the developing of the right attitude of mind in pupils. His work represents perhaps the most extreme emphasis of the importance of the heuristic method that we have.

STANLEY M. BLIGH. *The Direction of Desire.* New York: Henry Frowde, 1910. Pp. 360.

Teachers and preachers will find in this book a sound and stimulating application of psychology to self-development and the foundation of character. The author calls it directive psychology from the fact that it shows how to direct desire. The book should be in every public library.

*Education in the United States: A Series of Monographs.* NICHOLAS MURRAY BUTLER, Editor. New York: American Book Company, 1910. Pp. 1068. \$2.50.



This is a reprint in a single volume of the 20 monographs upon various aspects of American education originally prepared for the Paris Exposition in 1900 and the International Exposition at St. Louis in 1904. The material is the same as that comprised in the original series of paper covered pamphlets and the two-volume edition published by J. B. Lyon Company in 1900.

*Cleveland Public Schools. Annual Report of the Superintendent of Schools.* Cleveland: Board of Education, 1909. Pp. 129.

The report contains an interesting study of withdrawals, retardation, and repeaters in the Cleveland schools, a repetition of the tests of 1856 and 1905 in arithmetic showing an appreciable increase in the efficiency of pupils, and 50 pages of statistical tables prepared in accordance with recent demands for specific details in school reports.

STEPHEN S. COLVIN. *A Marked Case of Mimetic Ideation.* Reprinted from the *Psychological Review*, 17: No. 4, July, 1910. 260-268.

A discussion of the importance of kinaesthetic symbolic imagery in the thought process.

S. A. COURTIS. *Manual of Instructions for Giving and Scoring the Courtis Standard Tests in Arithmetic.* Detroit, Mich.: S. A. Courtis, 441 John R. Street, 1910. Pp. 40.

A carefully constructed set of tests for measuring the abilities of pupils in the fundamental operations of arithmetic and in arithmetical reasoning.

WALTER FENNO DEARBORN. *School and University Grades.* Bulletin of the University of Wisconsin, No. 368. 1910. Pp. 59.

Based on a study of 15,000 grades assigned by about 250 teachers in several elementary and high schools and the University of Wisconsin. A survey of the general subject of the distribution of mental ability is followed by a discussion of inequalities in grading, of grades in school subjects, and of university grades, and the author concludes with a section on correlation of schools and school subjects. There are 28 illustrative figures and one plate.

E. C. ELLICOTT. *Outline of a Tentative Scheme for the Measurement of Teaching Efficiency.* Madison, Wis.: Published by the State Department of Public Instruction, 1910. Pp. 4.

According to this scheme, the following qualities are to be rated by supervisors: (1) physical efficiency, 12 points; (2) moral (native) efficiency, 14 points; (3) administrative efficiency, 10 points; (4) dynamic efficiency, 24 points; (5) projected efficiency, 6 points; (6) achieved efficiency, 24 points; (7) social efficiency, 10 points.

JOSEPH GRASSET. *The Marvels beyond Science*. Translated by Rene Jacques Tubeuf. New York: Funk & Wagnalls Company, 1910. Pp. 379, Pr. \$1.75.

"A record of progress made in the reduction of occult phenomena to a scientific basis."

JOSEPH KINMONT HART. *A Critical Study of Current Theories of Moral Education*. Chicago: The University of Chicago Press, 1910. Pp. 48. Paper, 53c.

A study of the sanctions of moral education on the basis of modern conceptions of ethics.

PAUL KULLMAN. *Statistische Untersuchungen zur Sprachpsychologie*. Reprinted from *Zeitschrift für Psychologie*, 54: 290-310. Leipzig: J. A. Barth, 1909.

An examination of selected texts of Goethe, Schiller, Heine, and others, shows that the greatest number of monosyllables is found in ordinary conversation, and this is followed by the drama, the familiar letter, the formal letter, the narrative, and the essay, in the order mentioned. The average number of syllables per word increases in the same order. Emotionally toned texts show a larger number of monosyllables and a lower average number of syllables per word than texts of neutral tone.

JOSEPH McCABE. *Evolution of Mind*. London: Adam & Charles Black. New York: The Macmillan Company, Agents, 1910. Pp. xvii, 286. \$2.00 net.

The author has made a painstaking survey of recent contributions to geology, paleontology, biology, and neurology for evidences of the origin and development of consciousness. He is inclined to deny consciousness to all creatures below mammals. Jennings, Loeb and Thorndyke are the only American students of animal behavior with whose work he seems to be familiar.

W. PETERS. *Ueber Aehnlichkeitsassoziation*. Reprinted from *Zeitschrift für Psychologie*, 56: 161-206. Leipzig: J. A. Barth, 1910.

Dr. Peters has made a careful experimental study of association by similarity in the production and reproduction of nonsense syllables. As a result of his investigations he bases this type of association upon the "perseverative tendency" (*Perseverationstendenz*) of impressions, whereby any experience (percept, image, idea), once aroused, tends to rise again in consciousness of its own accord. This perseverative tendency may be total or only partial. It is the partial perseverative tendency of ideas that furnishes the linkage in our thought.

GEORGE RIES. *Beiträge zur Methodik der Intelligenzprüfung*. Reprinted from *Zeitschrift für Psychologie*, 56: 321-343. Leipzig: J. A. Barth, 1910.

The author has developed two methods of testing the intelligence of school children, (1) by their ability to associate pairs of concepts, such as hunger—swoon, thaw—flood, accident—horror, light—brightness, etc., after a single reading, so that when one is given the other will be recalled; (2) by their readiness in offering a word which shall stand in relation to a spoken word as effect to cause. Both of these methods the author thinks superior to Ebbinghaus' combination method.

HENRIK SCHEUCK. *Inbjudningsskrift till ahörande af den offentliga föreläsning med hvilken Professorn I. Pedagogik Bertil Hammer tillträder sitt ambete*. Uppsala, 1910. Pp. 67.

An academic address on the history of pedagogy in Sweden.

EDWIN E. SLOSSON. *Great American Universities*. New York: The Macmillan Company, 1910. Pp. xx, 528.

This volume includes the papers on American universities first published in the *Independent*. The following institutions are represented by a chapter each. Harvard, Yale, Princeton, Stanford, California, Michigan, Wisconsin, Minnesota, Illinois, Cornell, Pennsylvania, Johns Hopkins, Chicago, and Columbia. A chapter of comparisons and conclusions completes the volume.

W. STERN. *Das übernormale Kind*. Der Sämman: February and March, 1910. 67-72, 160-167.

Professor Stern points out that for centuries we have had a pedagogy of normal children, that in recent years much thought has been given to the pedagogy of sub-normal children, but that nowhere has any attention been paid to the pedagogy of the supernormal. Yet the latter are the most important of all. He briefly indicates some of the characteristic of the supernormal child and outlines the salient features of an experimental pedagogy of the supernormal.

J. ARTHUR THOMPSON. *Darwinism and Human Life*. New York: Henry Holt and Company. Pp. 237.

We have here a charming tribute of appreciation, beautifully expressed in such a way that the meaning of evolution in the various aspects of life is seen in panoramic view, while we pay tribute to the world's greatest scientist. The book is the South African Lectures for 1909 and contains six divisions: What we owe to Darwin; The web of life; The struggle for existence; The raw materials of progress; Facts of inheritance; Selection—original and social. The book is simple enough to be read by young students, and contains a good bibliography.

EDWARD L. THORNDIKE. *Handwriting*. Teachers College Record, 11: No. 2, March, 1910. Pp. 93. 30c.

In Part I the author describes the construction of a scale to measure the quality of handwritings of children in grades 5 to 8, and in Part II he discusses the application of this scale in measuring the speed and quality of handwriting in seven school systems. It is one of the most significant of recent contributions to the science of experimental pedagogy.

EDWARD BRADFORD TITCHENER. *A Text-book of Psychology*. New York: The Macmillan Company, 1910. Pp. xx, 565. \$2.00 net.

The first part of this text-book appeared in 1909. The second part is now ready and is issued separately for the convenience of those who have already purchased Part I. The two parts are here published as a single book, and furnish the most accurate and authoritative brief compendium of the status of experimental psychology that is available in any language.













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